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ABSTRACT

Materials contained in this curriculum guide were developed to provide both regular and special education instructors at the elementary school level as well as elementary school industrial arts consultants with some understanding of how industrial arts activities can be used to enrich the elementary school program. Discussion covers a definition and philosophy behind using industrial arts activities at the elementary school level; general goals of the elementary school and industrial arts in the elementary school; objectives to stress with the gifted, the educable mentally retarded, children with learning disabilities, children with emotional problems, and children with physical handicaps; developmental tasks of elementary school youth; methods of integrating industrial arts with other school subjects; and methods of implementing career education in the elementary school. The major portion of the guide consists of applicable projects and activities by grade level (K-6) including a description of project objectives, project developmental tasks, integration of project with other subject areas, how project facilitates career education, construction procedure, bill of materials, tools needed, and working drawings. A suggested outline for a workshop to be conducted by the industrial arts consultant-specialist for elementary school teachers, a suggested tool list, and a bibliography are appended. (Editor/TA)

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A CURRICULUM GUIDE FOR INDUSTRIAL ARTS IN THE ELEMENTARY SCHOOL

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IA 459 CLASS - INDUSTRIAL ARTS IN THE ELEMENTARY SCHOOL - SUMMER, 1976

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DEFINITION OF INDUSTRIAL ARTS IN THE ELEMENTARY SCHOOL

Elementary Industrial Arts is an activity oriented program within general education which provides orientation and awareness of changing occupations, materials, processes, and social aspects of industry through authentic experiences integrated with other studies of the curriculum.

PHILOSOPHICAL STATEMENT

People become what they perceive - what they experience and psychologically consume. Just as the food we eat and the air we breathe become part of us physically, so do the sights we see and the sounds we hear. The things and people we experience become part of us psychologically. If our children are to best profit from these occurrences, they must also be able to understand the interactions and interdependencies between our society and technology of today.

With the increasing complexity and mechanization of our industrialized society, it is essential that industrial arts experiences be regarded as basic and fundamental for youth of all ages. As the business of living becomes more complex it will put more responsibility on the teacher to cover pertinent resource information. Using industrial arts as a basis to help tie all subject areas together, a greater correlation between these related subjects can be achieved. Concurrently, emphasis is also placed on the students participation in a wide range of related experiences that lead to direction, order, personal satisfaction, later career choices or worthwhile avocational activities. Through industrial arts and the related areas, the student will develop manipulative skills, the ability to think critically, analyze, create, make decisions, evaluate, solve problems, and adjust to changes that are necessary in a technological world.

GENERAL GOALS OF THE ELEMENTARY SCHOOL

1. Provide the student with a general education (basic reading, writing and math skills are stressed).

2. Develop social and moral behavior.

3. Develop physical skills.

4. Encourage and assist the child in assuming the responsibility for some of his own learning in an independent manner.

5. Education is a process of discovery as well as assimilation. Give each child an opportunity to think imaginatively and openly and to explain his own ideas.

6. Give student an opportunity to sense, feel and absorb learning experiences.

7. Give student, regardless of his capabilities, a chance to find success in some area of school life. The faster student should not have to slow down and the slower student should be able to progress at his own speed.

8. Experiences should make each individual develop socially and intellectually so that in the future he can realize his own potentials.

9. Develop accurate concepts that can be expanded into generalizations later when their minds can handle complex situations.

10. Foster interaction of students with each other and adults to improve home, school and community relationships.

11. Teach personal habits of cleanliness, eating, care of property and safety.

12. Develop an understanding and appreciation of the physical world.

13. Develop a desire for learning now and in the future.

14. Learn how to respect and get along with people who think, dress, and act differently.

15. Exhibit a sensitive awareness of the relationships which exist between themselves and the environment.

16. Gain the ability to define a problem and develop probable alternatives for its solution.

17. Understand the meaning of culture and recognize how cultural borrowing and values affect man in relation to his society.

18. Appreciate art, music, literature and other cultural contributions of all nations.

19. Provide educational opportunities which will be in line with conditions in the areas and world today.

GENERAL GOALS OF INDUSTRIAL ARTS IN THE ELEMENTARY SCHOOL

1. To teach fundamental skills in Industrial Arts.
2. To establish learning readiness.
3. To provide for individual differences.
4. To increase an appreciation for good craftsmanship and design.
5. To cover in whole industrial processes, tools, materials and occupations in order to develop conceptual relationships.
6. Emphasize experience by doing so learning is activity-oriented and can occur without lecturing.
7. Study authentic industrial activities.
8. Coordinate activities for logical concept developmen and skills acquistion.
9. Coordinate developmental tasks with maturity level of student.
10. To increase awareness in the world at work through field trips to industrial and/or occupational sites.
11. Develop self-awareness.
12. To develop individual differences.
13. To increase consumer knowledge to a point where students can select, use, and maintain the products of industry intelligently.
14. To develop in each student the foundation work which will contribute much toward the vocational preparation and avocational enjoyment of further education and/or study.
15. To develop desirable health and safety attitudes and practices through work situations.
16. To give knowledge of career information.
17. To understand the influence of technology and make comparisons of operating and efficiency of craft and mass production.
18. To develop social relationships, such as cooperation, tolerance, leadership, followership, and tact.

OBJECTIVES TO STRESS WITH THE GIFTED

The Gifted Child

Definition:

A study done by Lewis Madison Terman states that the gifted child is superior to a normal child in physical development and has fewer incidents of physical defects and abnormal conditions than the general population. He further noted that these children were taller, stronger, healthier, and better adapted socially. In the broadest sense, the gifted are naturally endowed with a high degree of mental ability, either general or special. There is a difference of opinion as to just where the IQ limitations are, but it is generally accepted to be those individuals whose IQ tests are above the 130. These marks can be somewhat misleading, but when combined with the many varied written and verbal tests that are given to these individuals, and when taken in conjunction with recommendations from teacher observation, the gifted population can be identified.

Characteristics (Positive):

1. Early readers.
2. Learns rapidly.
3. Retains what they learn.
4. Strong desire to excel.
5. Seeks older companions.
6. Reasons things out.

Characteristics (Negative):

1. Restless and inattentive.
2. Poor in spelling.
3. Lackadaisical.
4. Critical of themselves and others
5. Many times lack organized good study habits.

Precautions when dealing with this population:

1. Teacher judgement and identification must be clearly defined.
2. A program cannot be routine or too easy.

Specific goals for the gifted student that are especially adaptable for an industrial arts program.

1. Provide opportunities to compete.

2. Provide opportunities to create and imagine.

3. Give the gifted student the opportunity to research.

4. Acquaint the student with the means for creative use of leisure time.

5. Provide opportunities for analysis and modification of models.

6. Provide work opportunities that do not emphasize bookwork activities but cultivate self-directed learning.

7. Conduct activities which aid in the early identification of potential abilities.

OBJECTIVES TO STRESS WITH THE EDUCABLE MENTALLY RETARDED

The Educable Mentally Retarded (EMR)

Definition:

According to the American Association on Mental Deficiency, "mental retardation refers to subaverage intellectual functioning which originates during the developmental period and is associated with impairment of one or more of the following: 1. adaptive behavior, 2. learning, 3. social adjustment."

Kirk and Johnson in their book Educating the Retarded Child, there were three groups of retarded children. The mentally deficient, including the trainable with an IQ range of 30-50, the mentally handicapped, the EMR with an IQ range of 50-80, and lastly the slow learner with an IQ range from 80-95. It is with the last two groups in which we will be primarily concerned. Some characteristics and points of emphasis are as follows:

Irregular class attendance is a problem
Innate inferiority of general intelligence
Inadequate class organization
Uncorrected defects in sight and hearing
Lacks verbal facility and numerical ability

Some points to stress in your instruction with this population:

Use a question method of instruction
Be careful that standards are not set too high
Less emphasis on reading
Social problems
The necessity of being on time and following directions
Assume their share of a given task
Importance of completing a task of project

Set up a reward system to help in reinforcement. Use whatever will work with the student; points, signatures, whatever it takes to keep interest high in the student and a goal insight that he can attain. A good self-image is to be sought after and an attainable goal.

Specific goals for the mentally retarded that are especially adaptable for an industrial arts program.

1. They should learn to work together with others and participate in group projects.

2. They should learn to participate in work for the sense of accomplishment that will be derived upon a successful task completion.

3. They should develop emotional security and emotional independence in school.

4. They should develop habits of health and safety.

5. They should learn the minimum essentials of tool subjects.

6. They should learn to develop leisure time activities and develop a sense of pride in one's accomplishments.

OBJECTIVES TO STRESS WITH CHILDREN WITH A LEARNING DISABILITY

According to a committee formulated by the U.S. Office of Education "Learning disability refers to one or more significant deficits in essential learning processes requiring special education techniques for remediation.

Children with learning disability generally demonstrate a discrepancy between expected and actual achievement in one or more areas, such as spoken, read or written language, mathematics and spatial orientation.

The learning disability referred to is not primarily the result of sensory, motor, intellectual or emotional handicap, or lack of the opportunity to learn.

The following are characteristics that may be used to identify learning disabilities:

1. Hyperactivity
2. Perceptual motor impairment
3. Emotional liability
4. General coordination deficits
5. Disorder of attention
6. Impulsiveness
7. Disorder of memory and thinking
8. Specific learning disabilities - learning how to read, write, spell, do mathematics
9. Disorders of speech and hearing
10. Neurological signs - such as E.E.G.

Objectives for learning disabled children.

1. Improve hand and eye coordination.
2. Increase hearing ability .
3. Increase memory ability.
4. Enable the student to share ideas.
5. The student will be able to follow reasonable classroom routine.
6. He will consistently follow rules of the classroom.
7. The child will gain confidence by completing a difficult task.
8. The child will develop the ability to follow instructions.
9. Develop the ability to recognize shapes of objects.
10. The student will develop laterality and directionality.
11. Develop body awareness.
12. Develop the ability to identify the position of objects.
13. Distinguish between smooth and rough surfaces.

14. Develop a recognition of acceptable and unacceptable behavior in the classroom.
15. Once given verbal directions, the student will be able to follow them in a correct order.
16. Develop students' self-confidence in himself and in his ability to perform.
17. Develop a student's ability to adapt to differing situations.
18. To develop socialization of the student.

OBJECTIVES TO STRESS WITH CHILDREN WITH EMOTIONAL PROBLEMS

The definitions of emotional disturbance are many, but generally it is behavior characteristic of one or more of the following:

a. Adjustment inability
b. Excessive anxiety and distrust
c. Actions that lack structure, but are not caused by mental deficiency.

Characteristics:

a. 10% of all children need some help for emotional problems; only 16% of this is currently being helped.
b. The following specific behavioral patterns may indicate emotional disturbance.
    1. Inability to listen.
    2. Inability to follow directions.
    3. Inability to stay on a topic.
    4. A child who cannot take turns.
    5. A child who engages in behavior continually to gain attention.
    6. The inability to ask relevant questions.
    7. Emotional outbursts at the slightest provocation.
    8. A child who feels he is "unworthy."
c. There are two types of emotional disturbance.
    1. Easily recognizable (yells, jumps out window).
    2. Difficult to recognize (quiet failure).

Objectives of Industrial Arts for the emotionally disturbed student:

a. Place less emphasis on textbook.
b. Provide opportunities for both individual and group projects.
c. More emphasis on tools, etc. as vehicles of instruction.
d. Reasons for and development of safety procedures.
e. Closer interaction and understanding between student and teacher.
f. Develop listening skills and sensory perception.
g. Develop understanding through use of audio-visual aids (films, demonstrations, etc.)
h. The industrial arts program, if handled properly, can act as a motivator to get the disturbed child interested in other school areas.
i. Projects, shop programs, and teacher must act as motivational factors.
j. The program must set reasonable limits for each child on an individual basis.

OBJECTIVES TO STRESS WITH CHILDREN WITH PHYSICAL HANDICAPS

Definition:

There is no distinct definition of the physically handicapped child as it covers a broad area of handicapped children. The largest areas of handicaps are blindness, deafness, neurologically impaired, and orthopedically handicapped. Each of these areas of physically handicapped has their own definition. They are:

> Blindness - Visual acuity for distance vision of 20/200 or less in the better eye, with best correction or visual acuity of more than 20/200 if the widest diameter of field of vision subtends an angle no greater than 20 degrees.
>
> Deafness - The child who is born with little or no hearing, or who has suffered the loss early in infancy before speech and language patterns are acquired is said to be deaf. One who is born with normal hearing and reaches the age where he can produce and comprehend speech but subsequently loses his hearing is described as deafened. The hard of hearing are those with reduced hearing acuity either since birth or acquired at any time during life.
>
> Neurologically Impaired - Damage to the brain caused by lack of complete development or injury to the central nervous system.
>
> Orthopedically Handicapped - Children born with defects of nerves, muscles, or bones, the result either of inheritance or of a defect in development during the prenatal period.

In all of these areas the main concern in the education of these children is that they don't like to have "special" considerations made when they are enrolled with "normal" children. However, when special education facilities are needed there is a wide range of facilities that have been organized. Some of these are: Home Instruction, Hospital Schools, Institutions, Sheltered-Care Facilities, and Special Schools or classes.

Objectives for the physicall handicaoped that are adaptable for an industrial arts program are:

1. Develop skills that can be used for leisure time activities.

2. Develop the child's ability to function with his abilities.

3. Develop social and emotional adequacy in the child at home and in the school by providing him with opportunities for acquiring emotional security belongingness, and independence.

4. Develop each student's ability to evaluate his or her capabilities and limitations.

5. Develop backgrounds of education experiences to compensate for experiential deprivation and to prevent future learning problems.

6. To foster the development of emotional and social maturity.

DEVELOPMENTAL TASKS OF ELEMENTARY SCHOOL YOUTH

Grade K-1 (Ages 5 & 6)

1. Development of large muscles only, small muscles of hands not completely developed.
2. Motor skill development uneven.
3. Energetic and restless.
4. Needs wide variety of activities--balanced activity and rest.
5. Enjoys cooperative locomotor manipulative and imaginative play.
6. Curiosity outstanding.
7. Interested in immediate environment, understands only here and now.
8. Self-centered, selfish.
9. Interest span short.
10. Understands safety precautions.
11. Little understanding of time and space.
12. Handedness and eyedness established.

Grade 2-3 (Age 7 & 8)

1. Very active.
2. Can use hand muscles better.
3. Attention span short.
4. Takes responsibilities seriously.

5. Learning time and space relationship.

6. Has great imagination.

7. Relating self to larger community.

8. Can make conclusions from evaluations.

9. Sufficient planning of projects.

10. Organization of group activities and sharing.

11. Can understand role playing.

12. Eye-hand coordination improved.

Grade 4-5 (Ages 9-10)

1. Shows inventiveness and initiative in attacking and solving problems.

2. Has physical skills in using simple tools.

3. Can visualize a three-dimensional outcome.

4. Can follow sequenced oral and written directions.

5. Visualizes and selects wisely needed materials and accessories.

6. Can discover procedures and processes to use many resources for research.

7. Has ingenuity in the procurement of tools and materials.

8. Can maintain constant ongoing evaluation which develops critical thinking and reasoning on a cooperative basis.

9. Accepts and profits by the suggestion of others.

10. Likes to classify, arrange, and organize.

11. Shift to own age codes and rules.

12. Can understand abstractions and generalizations.

13. Interested in money.

14. Understands time and space.

Grade 6 (Age 11 & 12)

1. School and peer groups begin to supplement the family as crucially important socializing agencies.

2. Socializing influences emanating from the peer group become increasingly important in middle school.

3. Peer groups in middle childhood are sharply segregated by sex, and the peer group becomes an important shaper of sex roles.

4. Developing individuality, best friends.

5. The child is capable of taking the role of another in both a cognitive and emotional sense.

6. The child can empathize with others and understand the effects of his actions on them.

7. Rapid physical growth.

8. Uneven growths of different parts of the body.

9. Wide range of individual differences in maturity level.

10. Teasing and seeming antagonism between boys and girls groups.

11. Often becomes overcritical, changeable, rebellious, uncooperative.

12. Understanding the physical and emotional changes about to come.

13. Opportunities for greater independence and for carrying more responsibility without pressure.

14. Strong identification with an admired adult.

METHODS FOR INTEGRATING INDUSTRIAL ARTS WITH OTHER SUBJECTS

Grade K-1

Industrial Arts can be implemented into the curriculum of grades K-1 through the study of communications. A suggested activity could be the construction of a string telephone which can touch social studies, language, science, math and fine arts.

Topic - Communications

Activity - Construction of a string telephone

Social Studies - How the phone has effected our lives and the history of our country

Language - How to answer the phone properly

Math - Using a numbers wheel they can learn counting

Science - How sound gets from one phone to another

Fine Arts - The transformation of the design of the phone through the years

Grade 2-3

Industrial Arts can be implemented into the curriculum of grades 2-3 through the study of transportation. A suggested activity can be the construction of a covered wagon which can touch social studies, language, math, science, and fine arts.

Topic - Transportation

Activity - Construction of a covered wagon

Social Studies - The westward movement of the pioneers

Language - The use of books to show how the pioneers moved west. New vocabulary will be learned.

Math - The measurements needed to build the wagon will teach numbers and the ruler.

Science - Where the different materials come from for the building of the wagon.

Fine Arts - The esthetic design and decorating of the wagon

Grade 4-5

Industrial Arts can be implemented into the curriculum of grades 4-5 through the study of textile and clothing. A suggested activity can be the construction of a simple rug loom which can touch social studies, language, math, science, and fine arts.

Topic - Textile and clothing

Activity - Construction of a simple rug loom

Social Studies - How was the rug loom invented, how it progressed and how was it used in other cultures.

Language - Vocabulary related to the loom, writing a booklet on its history and directions on its use.

Math - Measurements to build the loom and calculate the amount of material needed.

Science - Learning about different fibers, their structure, and process o dying.

Fine Arts - Sketches of plans, design of loom, pictures of past looms, finish on loom, color coordination in looms.

Grade 6

Industrial Arts can be implemented into the curriculum of grade 6 through the study of shelter. A suggested activity can be the construction of models of colonial and modern homes which can touch social studies, language, math, science, and fine arts.

Topic - Shelter

Activity - Construction of colonial and modern homes

Social Studies - Study differences between colonial and modern plus the placement of settlements and cities

Language - Learning new vocabulary used in construction. Write with quill pens

Math - Use of scale measurements
Use of metric and English systems

Science - Basic principles of machines and their use in building types of materials needed

Fine Arts - Design and decoration of homes past and present

METHODS OF IMPLEMENTING CAREER EDUCATION IN THE ELEMENTARY SCHOOL

Definition:

Career Education denotes the total effort by educational agencies and communities in presenting organized career oriented activities and experiences, information, and interactions which result in the formulation of a viable self-concept, which can be applied to occupational or avocational ends. The elementary level focusses on developing awareness of self and of the various clusters of careers.

Grades K-1:

1. View movies and other materials to gain knowledge and awareness of the world of work. Construct a bulletin board.

2. Construct and engage in role playing with puppets to gain knowledge of self and variety of occupations.

3. Conduct field trips followed by group discussions.

Grades 2-3:

1. The students will read about occupations in simple books.

2. People from varied occupational fields can come into the classroom to discuss their careers and life-styles.

3. Students can be taken on field trips to the site of business, professional, and industrial activities.

4. Role playing and imaginative play concerning "what I want to be when I grow up."

5. The class will construct a mural, using pictures and words concerning occupations.

6. Class will construct a future's wheel.

Grades 4-5:

1. Identify various kinds of jobs and personal interests and how they relate to life-styles, students interview parents, relatives, etc. and report to class.

2. Develop understanding of individual abilities and personal interests and their relationship to success in various occupations. Have various craftsmen demonstrate their crafts and how they are produced.

3. Group jobs into occupational families or career clusters and distinguish levels of jobs within each. Take field trips to various work sites to look at certain jobs being performed. Do role playing mass production from design to packaging.

4. Analyze problems to be able to make sound decisions. Have students research one phase of one industry and give reports, make models and displays.

Grade 6:

1. Develop understanding of classification and importance of people in various levels of different career clusters.

2. Develop understanding of individual personality traits and the relationship in dealing with others.

3. Develop understanding of the importance of recognizing alternatives in decision making.

4. Investigate general requirements pertaining to all jobs regarding education, training, salary, hours, etc.

5. Develop understanding of the law of supply and demand.

6. Develop understanding of the need to plan educational experiences related to tentative career clusters.

APPLICABLE PROJECTS AND
ACTIVITIES BY GRADE LEVEL

PLANTER - SUGGESTED GRADE LEVEL - K - 1

I. Objectives

Upon completion of this project, the student will be able to:

1. Saw a board to length using a miter box
2. Measure a board to a specific length in whole numbers
3. To use a template to mark the holes to be drilled
4. Use a hand drill to drill two holes in the project
5. To stain a board to a desired color

II. Developmental Tasks Facilitated By This Project

1. Eye-hand coordination will be improved
2. Gross motor control will be improved
3. Fine muscle control will be exercised
4. Will stimulate interest to an extended length of time
5. Will engage in inter-personal interests

III. Integration of Project With Other Subject Areas

1. Language Arts - New terms to learn, ie. spelling
2. Science - Study of growth, seasons and their effect on growth
3. Geography - Study of different plants found throughout the country
4. Math - Use of numbers in measuring
5. Fine Arts - Design and aesthetics

IV. How Project Facilitates Career Education

1. Role awareness of the farmer and what he provides
2. Role awareness of the gardner and the flowers he provides
3. Role awareness of the craftsman in project construction

V. Procedure

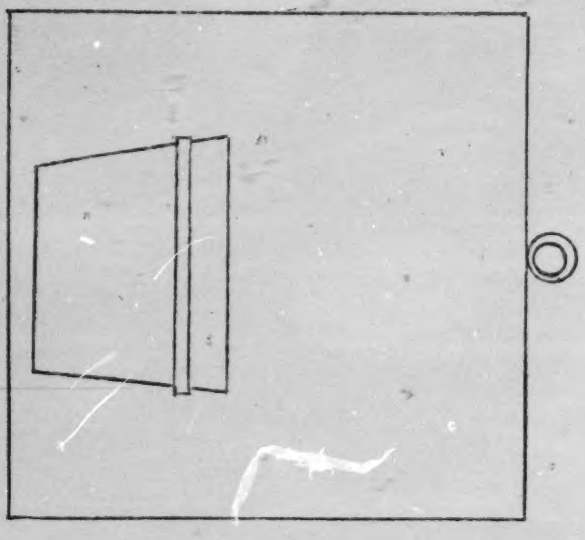
1. Obtain necessary tools, materials, and template.
2. The student will get a board that has been ripped to width
3. Using a scale, measure the board to length
4. Using the try-square, the line should be scribed on board
5. Using the miter box, cut the board to length
6. Using the file, file the rough ends
7. Using the template and scratch awl, mark the holes
8. Using the hand drill, drill both holes
9. Using the rough abrasive paper, sand the board
10. Using the fine paper, sand the board
11. With the length of coat hanger and the 2½" fixture (soup can) bend the loop for the pot
12. In place of the previous step, you may use an equal length of pipe cleaner
13. Place each end through the holes in the board
14. If using the coat hanger, place the loop down in a bench vise and bend ends up towards the top of the board
15. If using pipe cleaner, tie ends togeather in back
16. Using the stain, apply it to the project
17. Wipe off excess stain
18. Using paste wax, apply it to the project
19. Buff off wax
20. With scratch awl, mark top, middle of the board
21. Insert the eye-bolt in the hole marked at top of board
22. With cup or flower pot, fill with soil
23. Select seeds for either flowers or vegetables
24. Plant seeds
25. Water seeds
26. Place pot into planter and put planter in sunlight

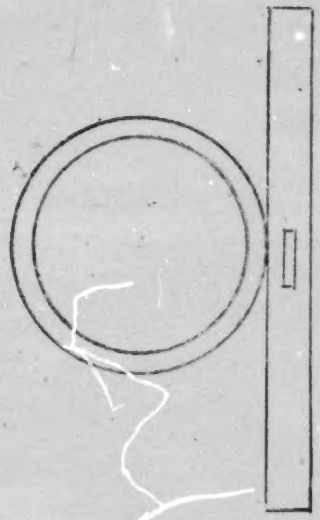
VI. Bill of Materials

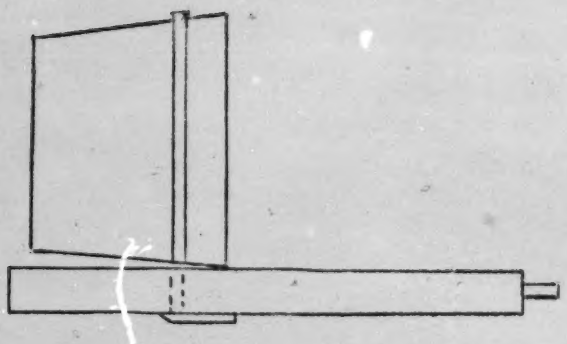
1. pine board - 6" x 8" x ½"
2. 11" piece of coat hanger wire - may be substituted with an equal length of pipe cleaner
3. 1 - small eye bolt
4. 1 - 2½" flower pot or cup
5. 1 - packet of seeds - flower or vegetables
6. 1 - can of stain
7. 1 - can of paste wax

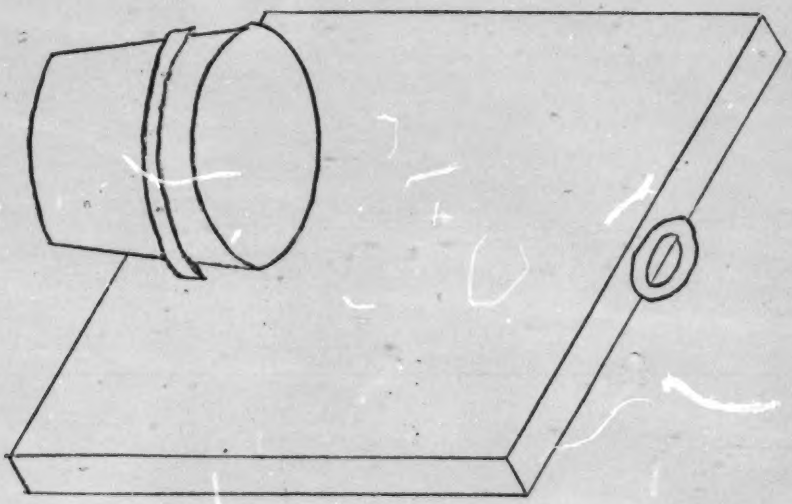
VII. Tools Needed

1. Miter box
2. Try-square
3. File
4. Abrasive paper - rough and fine
5. Pencil
6. Clean rags for applying stain and wax
7. Hand drill
8. 1/8" twist drill
9. Scratch awl
10. Scale
11. Pliers
12. 2½" radius can (soup can)



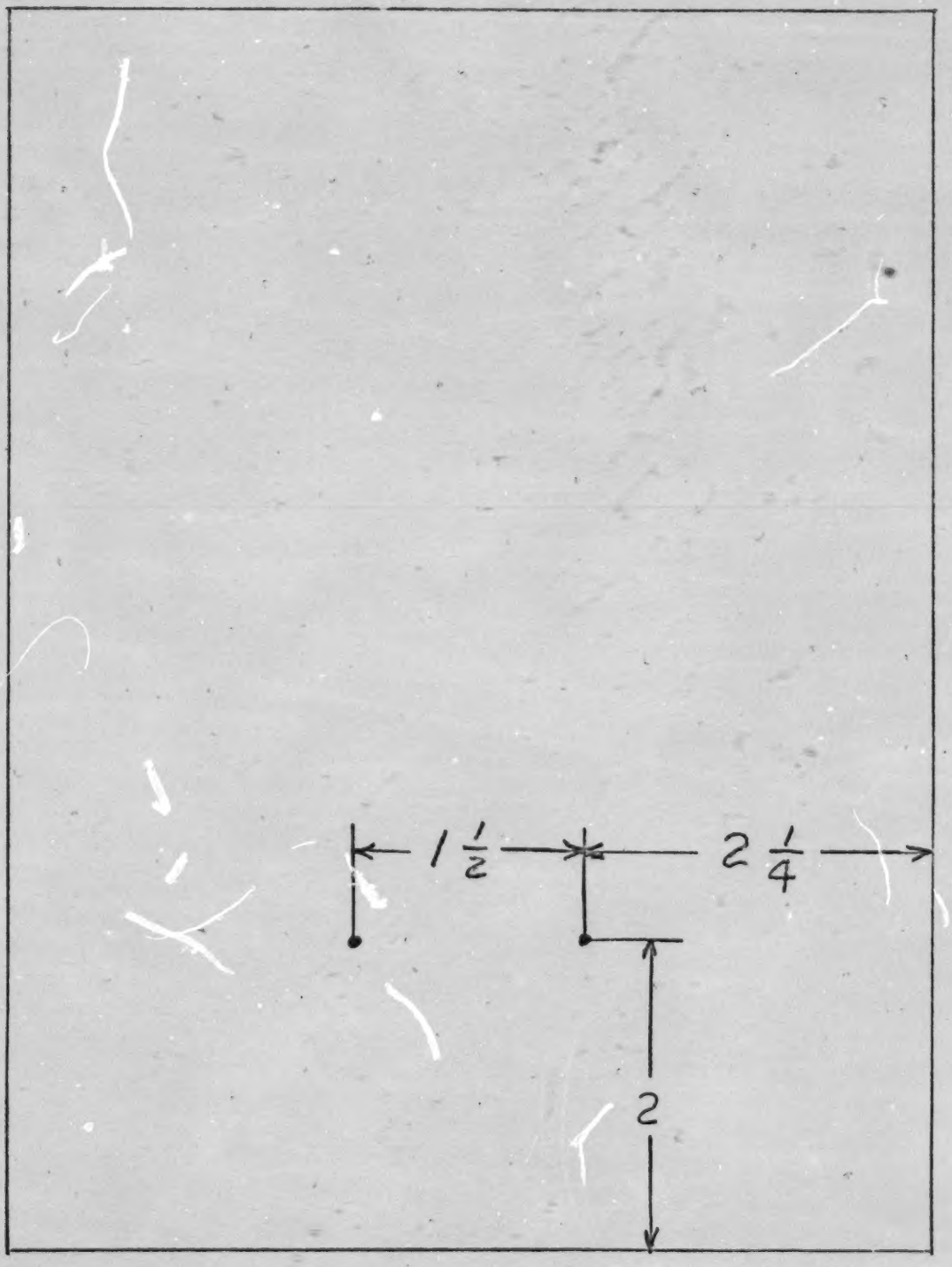






PLANTER TEMPLATE

6" x 8" x ½"



DECOUPAGE SUGGESTED GRADE LEVEL K-1

I. Objectives

Upon completion of this project, the student will be able to:

1. Use a pair of scissors to cut out a picture of his career.
2. Sand the edges of a board.
3. Apply a thin coat of stain to board.
4. Glue picture to board.
5. Apply a coat of varnish over picture and board.

II. Developmental Tasks Facilitated By This Project

1. Large muscle control
2. Friendships outside of family
3. Better understanding of careers

III. Integration of Project With Other Subject Areas

1. Social Studies - learning how today's jobs differ from yesterday's
2. Language - new vocabulary due to exposure of new careers
3. Art - coloring of wood with stain
4. Science - how varnish puts protective surface on piece of wood

IV. How Project Facilitates Career Education

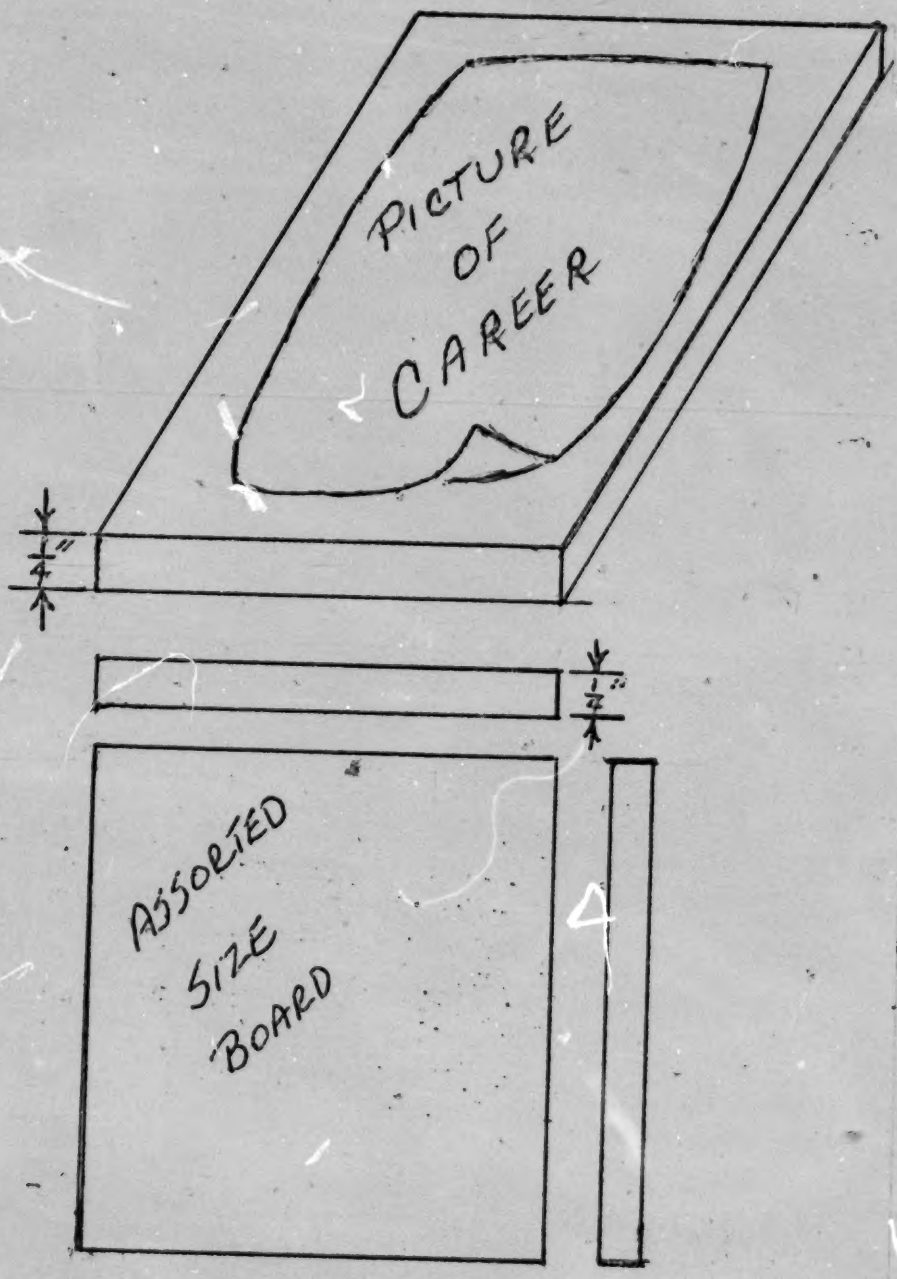
1. What each career does.
2. Types of dress needed for each occupation.
3. How to choose a career.

V. Procedure

1. Obtain necessary materials and tools.
2. Give magazines, books, comics, etc. to class.
3. Using scissors cut out desired career.
4. Select appropriate size of wood.
5. Using sandpaper, sand edges of wood.
6. Using poly-brush, apply coat of stain to board and wipe with rag before it dries.
7. Using Elmers glue, attach picture to piece of wood.
8. Using poly-brush, apply coat of varnish.
9. Allow to dry, then apply another coat of varnish.

VI. Bill of Materials

Magazines, comics, books
¼" plywood - assorted sizes
Elmers glue
Stain (water base)
Poly-brush
Varnish
120 grit sandpaper



I.A. 459 - Industrial Arts in the Elementary School

Grade Level K-1 String Telephone

A. Objectives:

Upon completion of this project the student will be able to:

1. Use a pair of scissors to cut string to length and cut paper.
2. Punch a hole in a tin can
3. Tie a knot in a piece of string.
4. Mock answering a telephone in a specified manner.

B. Developmental Tasks Facilitated By This Project

1. Fine muscle control
2. Better understanding of communication
3. Widen knowledge of immediate environment
4. Learn to work with others
5. Awaken curiosity
6. Increase vocabulary
7. Use proper language

C. How Project Can Be Integrated With Other Subject Areas

1. Social Studies - History of telephone, how the telephone has effected our lives and the history of our country.
2. Science - How sound gets through string, how it differs from home phone.
3. Math - Learn the numbers on a real telephone, cutting to length, cutting paper to correct size to wrap around can.
4. Language Arts - Proper way to answer a telephone, learn new words and their meaning.
5. Fine arts - Make your string phone more appealing

D. How Project Facilitates Career Education

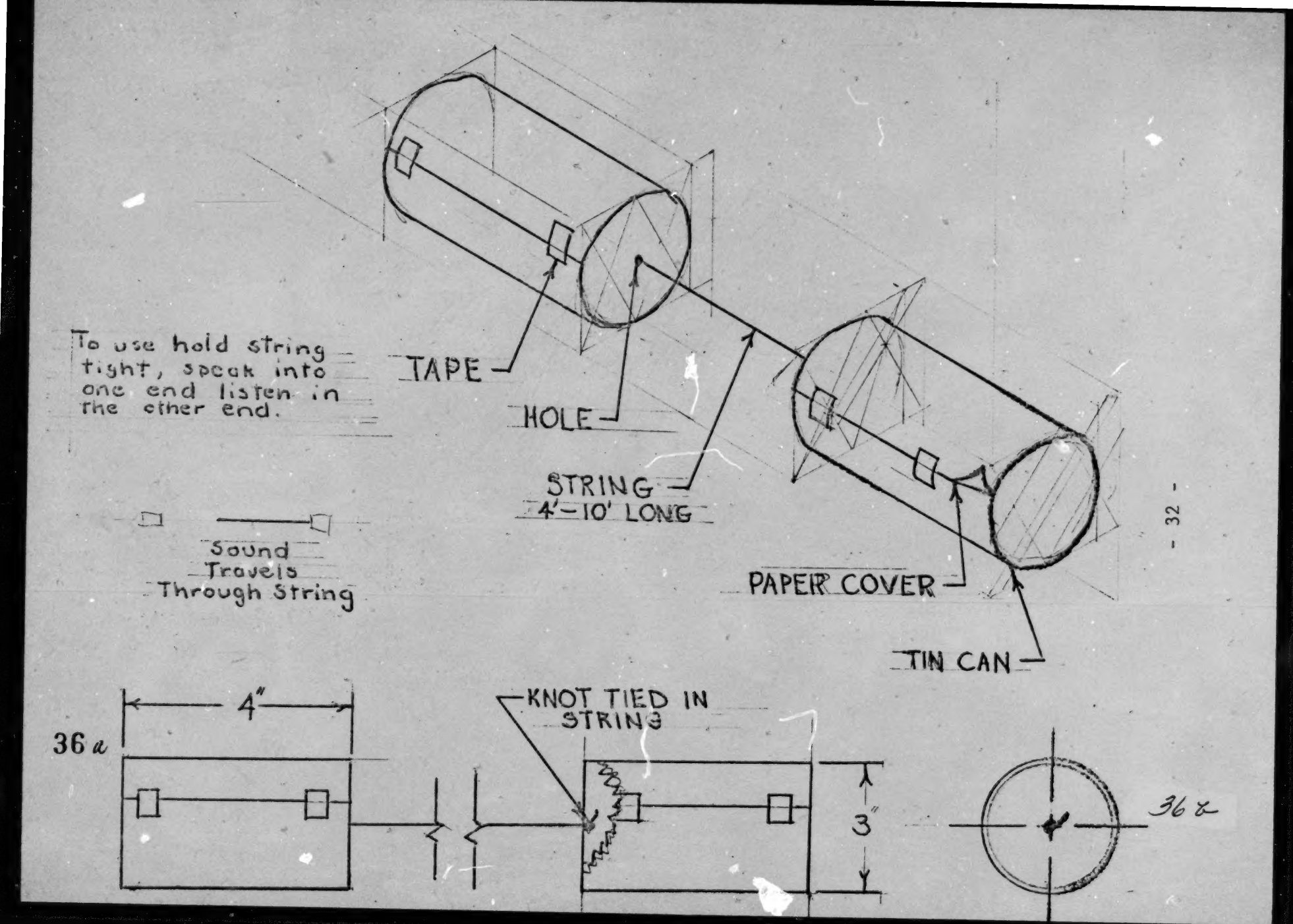
1. How a person in business will answer a telephone.
2. Jobs directly involved with use of a telephone.
3. How do we get telephones in our homes, who puts them there.
4. Where do the phone wires go?

E. Prodedure:

1. Obtain materials
2. Remove label from tin cans
3. Punch a hole in center of tin can
4. Cut string to length
5. Put string through hole in center of can
6. Tie knot in each end of string behind tin can
7. With two people, each holding one can, pull string tight, one person speaks into a can and one listens.

F. Bill Of Materials
1. String 4' - 10' long
2. Two tin cans
3. Tape
4. Paper to cover tin cans (gift wrapping paper, scrapes of wall paper, or construction paper.

G. Tools Needed
1. Awl
2. Rubber mallet
3. Scissors
4. Ruler


To use hold string tight, speak into one end listen in the other end.
TAPE
HOLE
STRING
4'-10' LONG
PAPER COVER
TIN CAN
Sound
Travels
Through String
4"
KNOT TIED IN
STRING
3"
36a
36b

Solar Oven Grades 2 - 3

A. Behavioral Objectives:

Upon completion of the project, the student will be able to :

1. Properly operate the solar oven.
2. Explain orally the basic principles of solar cooking.
3. Draw and illustrate the principles of the solar oven.

B. Developmental Tasks:

1. Eye hand coordination.
2. Fine muscle coordination.
3. Introductory alternative energy experience.
4. Time and space relationship.

C. Integration with other subject areas:

1. Language Arts: new vocabulary terms.
2. Math: Adding , Subtracting , involvement with angles, and times and temperatures required to cook.
3. Science: Prime movers of energy , choosing materials.
4. History: Past history and future predictions of energy systems.

D. How project facilitates Career Education:

1. Emphasis on a rapid changing employment field.
2. Study of future human needs.
3. Cause and effect as related to proper decision making.
4. Financial advantages of alternative systems.

E. Procedure:

1. Obtain all tools, materials, and templates.
2. Use templates to cut out all plywood pieces.
3. Use coping to cut sides of oven.
4. Using wooden pieces as templates, cut all copper pieces to fit interior oven walls.
5. Using the hot weld gun, glue two edges of each copper insulator to its corresponding plywood wall.

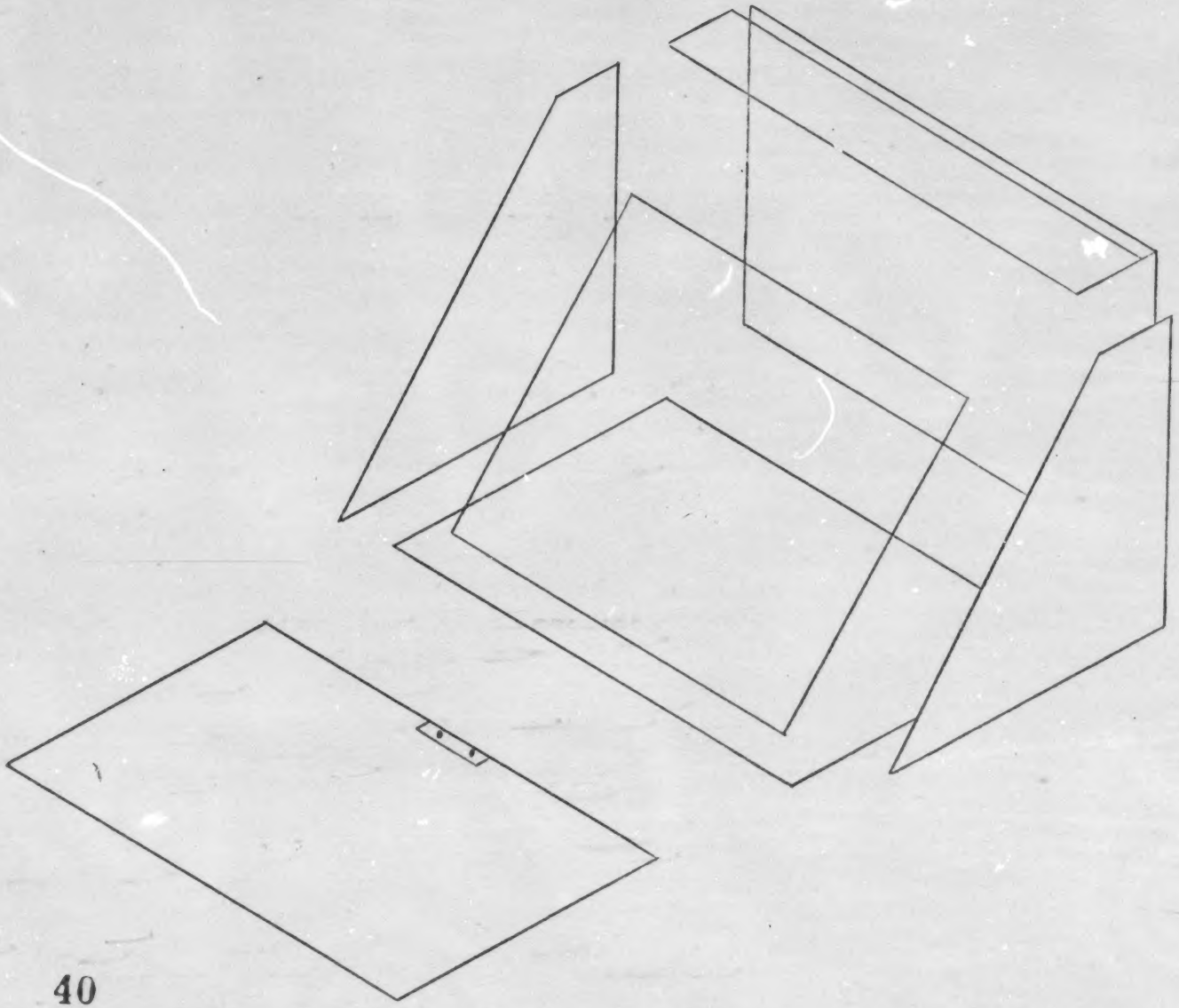
6. Fill all panels with fiberglass insulation.
7. Hot weld all panels closed to form an insulation panel.
8. Measure and cut molding for glass window, measure necessary depth of window.
9. Use measurements to nail moldings to side, top and bottom panels at proper depth.
10. Nail four wall panels together.
11. Fill the corners with hot weld glue.
12. Paint all insulating panels.
13. Apply glue to molding.
14. Apply thermo-strip to glue and more glue on top of itself.
15. Place first insulation pane of glass.
16. Repeat steps 13-15 for second pane of glass.
17. Measure rear door for hinge placement, drill pilot holes, screw hinges on.
18. Cover reflector panels (four) with aluminum foil and tape.
19. Measure and drill pilot holes into each panel.
20. Screw all hinges into place on panels.
21. Screw all panels into place on oven.
22. Space and apply adjustment tacks and wires on reflectors.
23. Cut and tack copper pieces around window.

F. Bill of Materials:

1. 3/8" plywood, 6 sq. ft.
2. 6 ft. molding 1" sq.
3. 3 sq. ft. copper flashing, 005 thickness.
4. 2 sq. ft. fiberglass insulation.
5. six, 1" utility hinges and screws.
6. 1 box 1/2" tacks.
7. 2 pieces of glass 10" x 13".
8. Insulation strip 6 ft.
9.

9. 8 sq. ft. aluminum foil.
10. masking tape.
11. string.
12. Paint - Flat black.
13. hot weld pellets.

G. Tool List:
1. 12. oz. claw hammer
2. coping saw
3. sabre saw
4. crosscut saw
5. hot weld gun
6. T-square
7. pencil
8. scissors
9. 12" wooden ruler
10. cross slot screw driver
11. hand drill
12. Paint brush



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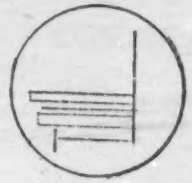

SEAL FOR
GLASS

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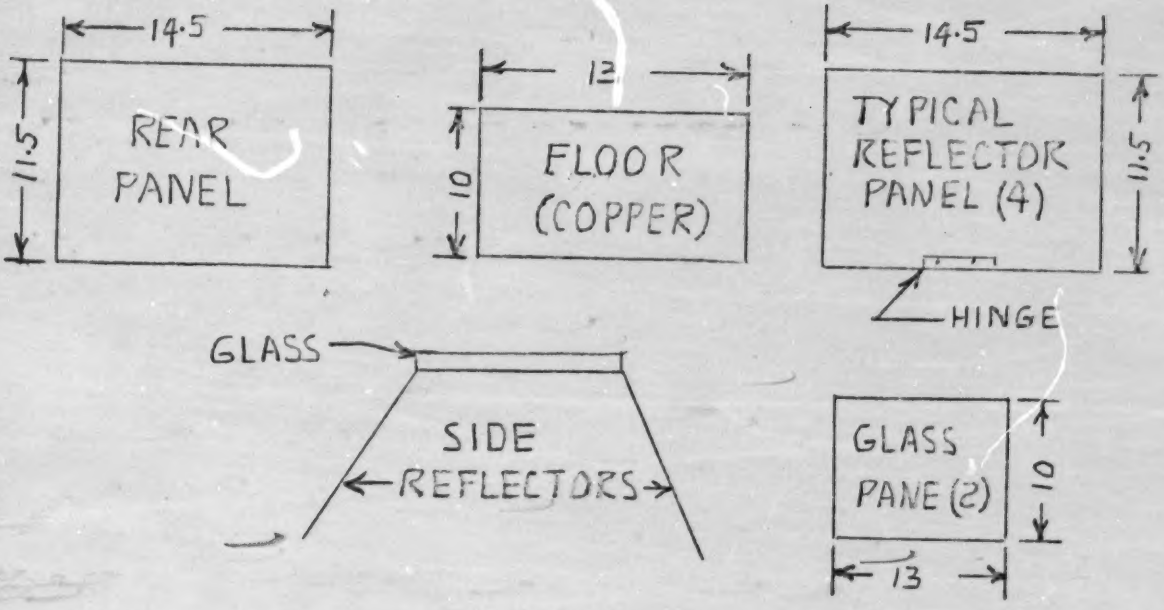
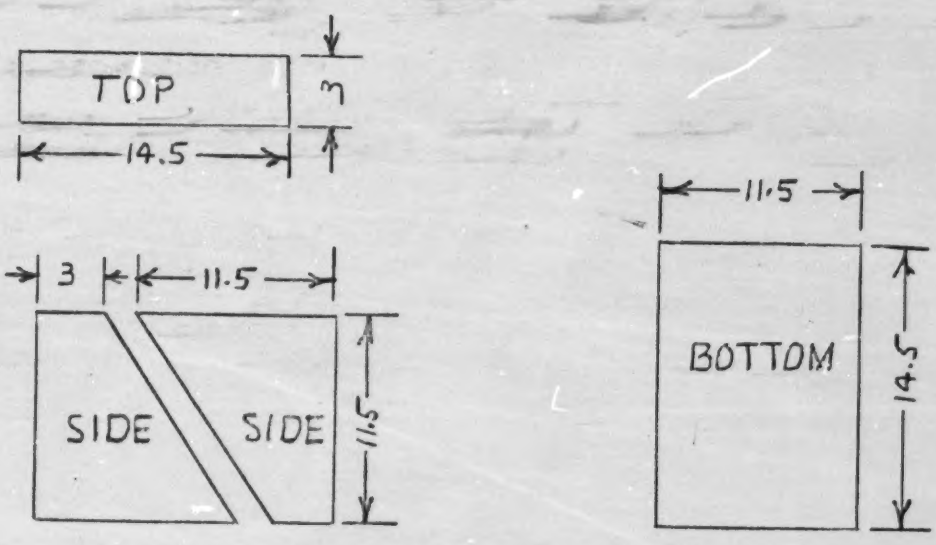




NOTE: ALL DIMENSIONS IN INCHES

BIRD FEEDER

GRADE LEVEL 2-3

I. Objectives

Upon completion of this project the student will be able to:

1. Measure whole inches.
2. Understand the use of some basic tools.
3. Use measuring cups to measure amounts of food.

II. Developmental Tasks Facilitated by Project

1. Eye-hand coordination.
2. Small muscle coordination.
3. Work cooperatively with other students.
4. Immediate satisfaction and recognition.
5. Relate his actions to the world around him.

III. Integration of Project With Other Subject Areas

1. Science - study of birds and ecology.
2. Mathematics - measuring - linear and volume.
3. Art - draw birds in a log or scrap book.
4. Language Arts - reading about birds and keeping a record of the ones seen with facts about them.

IV. How Project Facilitates Career Education

1. Jobs in ecology.
2. Ornothologists.
3. Importance of being alert and accurate.

V. Procedure

1. Obtain necessary tools and materials.
2. Measure length of stick of wood.
3. Use a miter box to cut stick of wood to length.
4. Mark holes on stick.
5. Drill holes halfway through wood.
6. Drive a nail into the center of each end of stick.
7. Cut two strings a given length.
8. Tie one string onto each nail.
9. Mix given amounts of birdseed with peanut butter.

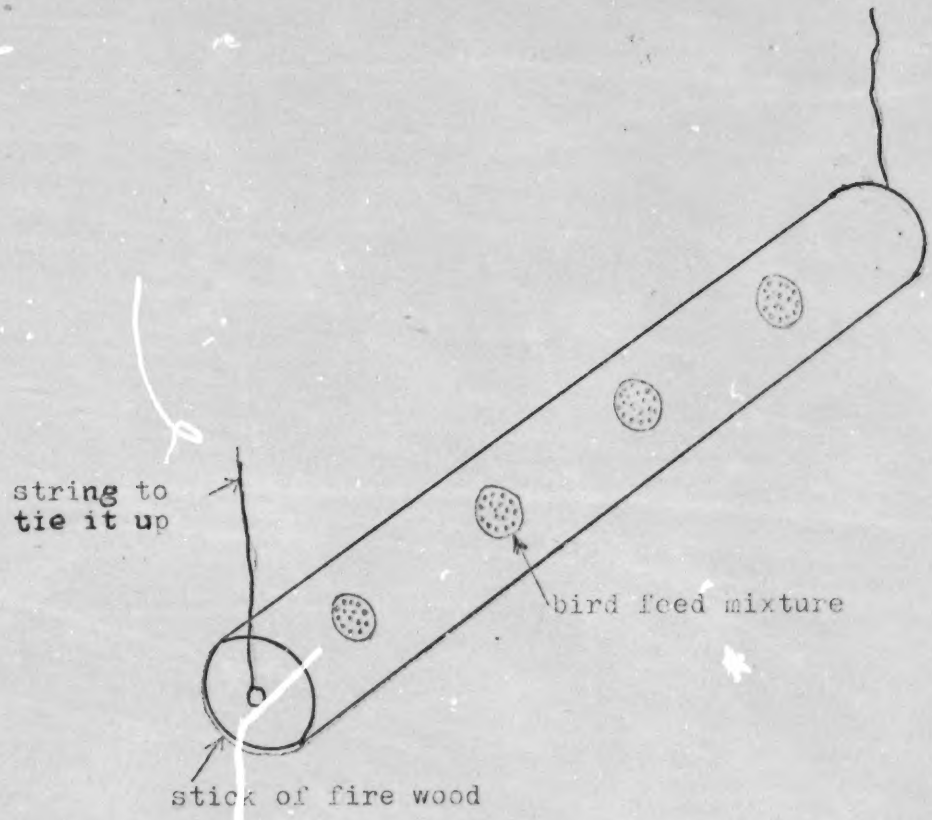
10. Put seed mixture into holes.
11. Hang up on a tree.
12. Keep a record of the birds that come.

VI. Bill of Materials

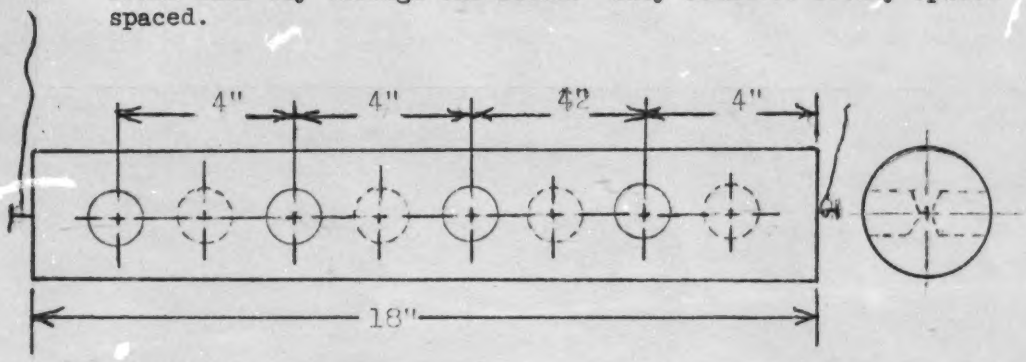
1. Stick of wood, approximately 2" in diameter, 12 to 24" long.
2. 2 - 4d common nails.
3. 2 - 24" pieces of string.
4. Peanut butter.
5. Bird seed. Any other type of food may be substituted for the peanut butter and bird seed mixture as long as it is sticky.

VII. Tools Needed

1. Hammer.
2. Miter box and saw.
3. Bitbrace.
4. Drill bit - any size 1/2" to 3/4".
5. Ruler.
6. Pencil.
7. Measuring cups.



Two or three sets of holes around stick set so they don't hit each other. Drill half way through the stick. They could be evenly spaced or randomly spaced.



- GRADE - 2nd or 3rd SLIPPERS

Objective:

Upon completion of the project the student will be abletto

1) Make a template.
2) Make a pattern.
3) Trace a template
4) Use a ruler to measure whole and half numbers.
5) Use an xacto knife and/or a coping saw safely.
6) Follow a set series of directions.
7) Conserve materials.

Developmental Tasks Facilitated By Project:

1) Hand and eye coordination
2) Small hand muscle motor skills
3) Esthictic senses

Intergrating Project With Other Subject Areas:

1) Science - body development, right and left
2) Math - measuring, ruler,
3) Language Arts - reading the directions, new words
4) Soc. Studies - footwear around the world
5) Art - Color combinations, design

Career Education and the Project:

1) Types of shoes worn by community Helpers- fireman, nurse, police, etc.
2) Field trips - shoestore, shoemaker, etc

- TOOLS NEEDED

Scissors
Xacto knife or coping saw
Ruler
Asst. Felt markers
Asst. size needles

BILL OF MATERIALS

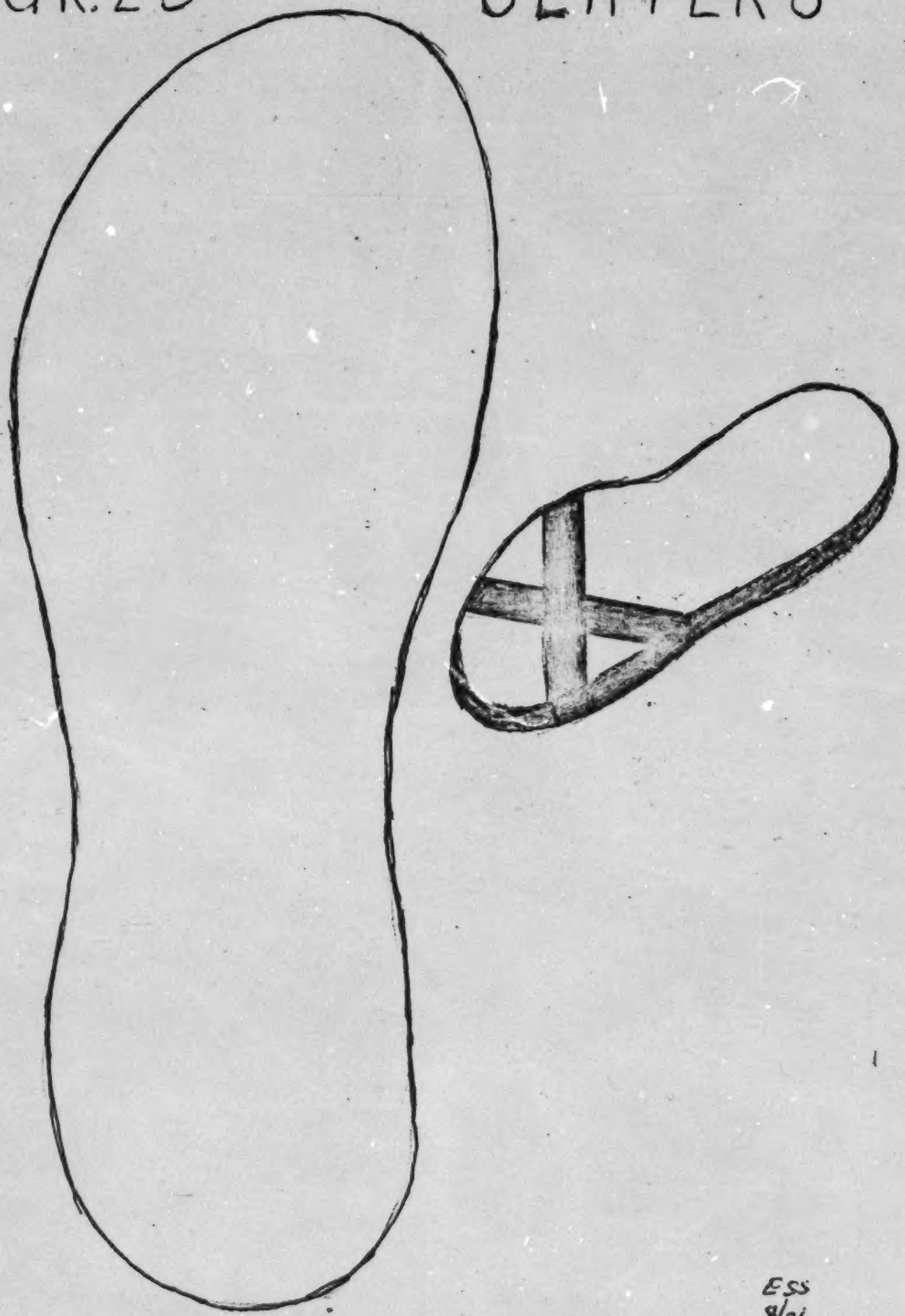
Styrofoam- ½"x10"x12" or heavy cardboard
Felt asst. colors
El mers glue
Oaktag
Tempera paints asst colors
Asst. sizes beads, buttons, macoroni

PROCEDURE

1. Trace a shoe or sneaker on a piece of oaktag.
2. Using the scissors cut out the pattern.
3. Trace the pattern on the styrofoam (2 slippers).
4. Cut out the slippers using the xacto knife/or coping saw.
5. Measure two felt strips 1½ wide and 12" long.
6. Using the scissors cut out the felt strips.
7. With the el mers glue assemble the slippers.
8. Steps 8 and (9 are optional
8. Decorate the felt strips with buttons, beads or macoroni.
9. Paint the slippers.

GR. 2-3

SLIPPERS



ESS
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Abacus Suggest Grade Level 4 - 5

I. Objectives

Upon completion of this project, the student will be able to:

1. Lay out evenly spaced holes using a rule
2. Cut a piece of wood to a given dimension
3. Cut dowel rods using a mitre box
4. Divide a board into two or more equal parts
5. Use a try square to mark out cutting lines
6. Measure accurately to 1/8"

II. Developmental tasks

1. Fine muscle control
2. Eye hand coordination
3. Cooperation
4. Interest in world people

III. Integration of project with other subject areas

1. Social Studies
   a. Origin of the abacus
   b. Abacus can be used to take polls in school
2. Science
   a. Abacus can be springboard for developing discusstion of today's computer
   b. Experiment can be run on hardness and strength of wood
3. Fine arts and creativity
   a. Create designs with different colored beads
   b. Different designs that can be used in making abacus
4. Language arts
   a. Research and write reports on origin of abacus
   b. Make vocabulary list of new words associated with research and building of abacus
5. Math
   a. Check answers to problems
   b. Teach metrics system

IV. How project facilitates career education

1. Introduces students to field of computers
2. Can be used to explore the political science field
3. It can be used for assembly line techniques

V. Procedure

1. Obtain necessary tools and materials
2. Lay out and cut two pieces 18" from $3\frac{1}{4}$" wide stock using backsaw and mitre box
3. Lay out and cut two pieces $10\frac{1}{2}$" from $3\frac{1}{2}$" wide stock using backsaw and mitre box

4. Lay out the ten equally spaced holes on the two 18" pieces
5. Clamp one of two pieces to the bench
6. Locate center of hole and start drill hole with awl.
7. Drill $\frac{1}{4}$"dia Hole to a depth of 9/16" using depth scale.
8. Sand all 4 pieces except end of $10\frac{1}{2}$" pieces
9. Cut $10\frac{1}{4}$ " dowel rods $11\frac{1}{2}$ long using the mitre box
10. Sand the dowel rods
11. Stain the dowel rods
12. Apply first coat of stain
13. Cut 100 beads from the 3/4" dowels 5/8" long using mitre box
14. Drill 5/16" hole through center of beads
15. Sand the beads
16. Paint the beads
17. Glue and nail one 18" piece to end of one $10\frac{1}{2}$" piece forming L shape
18. Repeat process for the other two
19. Place the $\frac{1}{4}$" dowel rods into holes of one of L shape pieces
20. Glue and nail two L shape pieces together forming rectangle
    Note: Be sure to align rods with holes in second L shape
21. Finish sanding
22. Stain the frame
23. Apply first coat of finish to frame
24. Allow to dry, then use fine steel wool to smooth coat
25. Apply second coat and allow to dry over night
26. Steel wool again
27. Wax frame

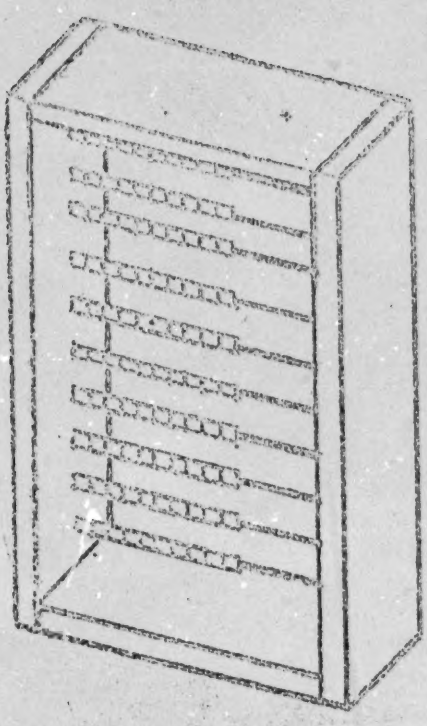
VI. Bill of material

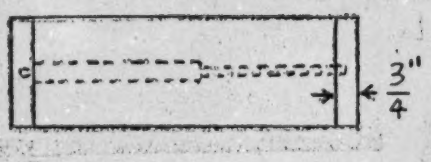
Quantity	Material	Length	Width	Thickness
10	Dowelrod	$11\frac{1}{2}$"	$\frac{1}{4}$ diam	
100	Dowelrod	5/8"	3/4"diam	
2	Pine	18"	$3\frac{1}{2}$"	3/4
2	Pine	$10\frac{1}{4}$"	$3\frac{1}{2}$"	3/4
8	Finish nails	$1\frac{1}{4}$	#4	

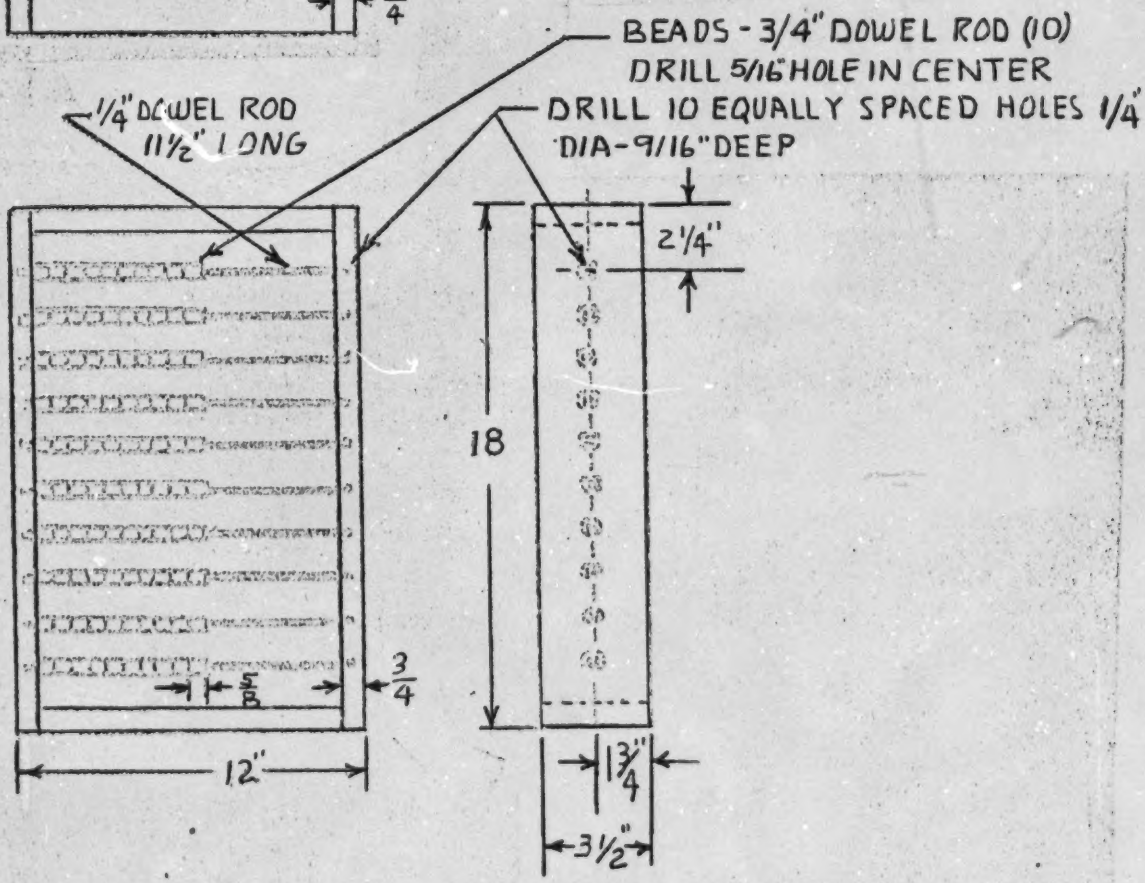
Stain - Latex walnut
Paint - Latex semigloss
Colors - Red, white, blue, black, green, orange, yellow, purple, brown, gray
Fine steel wool - abrasive paper - med. and fine
Note: Beads for this project can be purchased at a hobby or crafts store.

VII. Tool list
1. Back saw

ABACUS




3/4"


BEADS - 3/4" DOWEL ROD (10)
DRILL 5/16 HOLE IN CENTER
DRILL 10 EQUALLY SPACED HOLES 1/4" DIA - 9/16" DEEP
1/4" DOWEL ROD 11½" LONG
2¼"
18
1 5/8
3/4
12"
1 3/4"
3½"

LOOM - SUGGESTED GRADE LEVEL - 4

I. Objectives

Upon completion of this project, the students will be able to:

1. Punch holes in cardboard.
2. Measure the length of fabric needed.
3. Thread a needle.
4. Weave with a needle.

II. Developmental Tasks Facilitated by This Project

1. Fine muscle control.
2. Eye-hand coordination and separation.
3. Better understanding of the different types of fabrics.

III. Integration of Project With Other Subject Areas

1. Social Studies- how the loom was invented; how the loom progressed to what it is today; how the loom is used in other cultures.
2. Language Arts- vocabulary related to the parts of the loom; directions on use and how to weave.
3. Math- measuring parts of loom; calculating amount of material needed.
4. Science- the study of different types of fibers; the different structure of the fibers; chemicals used in dying of the fabric.
5. Fine Arts- sketches of plans of what loom will look like; design of loom; color coordination in making of article.

IV. How Project Facilitates Career Education

1. Emphasis on how cloth is made.
2. Learn about the careers of weavers, seamstress, and tailors.

V. Procedure

1. Obtain necessary materials.
2. Punch holes in cardboard.
3. Insert Brass Brads.
4. Wrap the loom between the brads.
5. Form bow in loom.
6. Cut the yarn to the desired length (with 4-ply Worsted Weight there is 12 wefts per inch).
7. Insert ruler as heddle, alternating wefts.
8. Weave with yarn needle as shuttle.
9. Using ruler, push down on weft to make tight weave.
10. Repeat again with shuttle only this time reversing direction and opposite weave (under in previous row is now on top and visa versa).
11. At end of weft tie knot n last warp.
12. When object finished, before taking off loom, weave in weft ends following directions of weft in pattern.
13. Take off from loom and smoothen out.

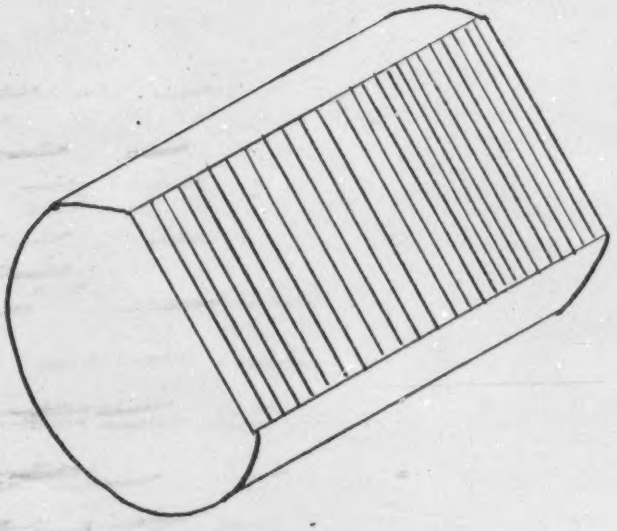
VI. Bill of Materials

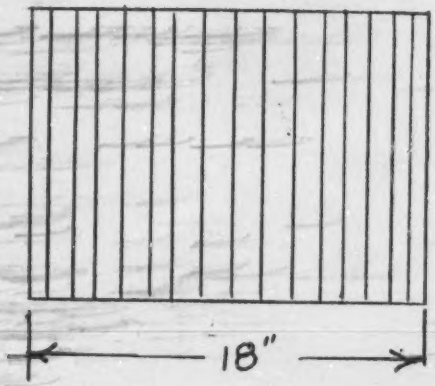
Cardboard 18" x 24"
Brass Brads
Yarn

VII. Tools Needed

Scissors
18" Ruler
Paper Punch
3" Plastic Yarn Needle

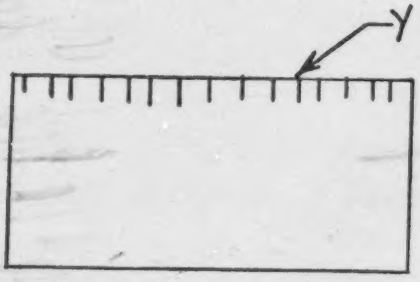
LOOM

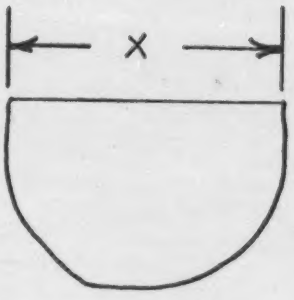




X = Dimension depending upon size of object to be made.

Y = ½ inch between centers of holes.





ELECTRIC MOTOR - SUGGESTED GRADE LEVEL 4/5

I. Objectives

Upon completion of this project, the student will be able to:

1. Wind a small wire coil.
2. Differentiate poles of a bar magnet.
3. Determine and correct balance and trueness in a simple rotating armature.
4. Trace the path of electricity in a simple circuit.

II. Developmental Tasks Facilitated by This Project

1. Fine eye-hand coordination
2. Making conclusions from evaluation (problem solving)
3. Factual interest towards real objects in adult world

III. Integration of Project with Other Subject Areas

1. Social Studies - other energy converters through the ages (windmills, water wheels, steam engine, etc.)
2. Language Arts - vocabulary; following written direction; writing up results of independant experiments, if any, with magnets, effect of rotor shape, etc.
3. Mathematics - measurement
4. Science - magnetic fields, induced and natural
5. Fine Arts - decoration of concealed base (optional)

IV. How Project Facilitates Career Education

1. Reveal individual interests and abilities toward the technical/electrical/mechanical.
2. Discuss the importance of electric motors to each occupational cluster.

V. Procedure

1. Obtain necessary tools and materials.
2. Using magnetic compass, find the North seeking pole of each magnet.
3. Using paint or nail polish, mark the N-pole; let dry.

4. (optional) Conduct independent experiments with magnets.
5. Using a 2 ft. length of wire, wind the rotor coil on a cork of similar object.
6. Bend the wire ends (axles) out at right angles from the coil on opposite sides.
7. Using thread or tape, fasten the windings of the coil.
8. Using blade or sandpaper, remove insulation from axles.
9. Using heavy paper, construct a cylinder the height of a magnet and bind with rubber band.
10. Pry all six magnets into the cylinder with each N-pole facing up.
11. Using blade or sandpaper, remove 1 inch of insulation from each end both foot long bearing wires.
12. Using sharp pencil point, bend one cleaned end of each bearing wire into the S-shaped cradle shown.
13. Bend the lower part of the bearing wires into flat feet with the bearing post just tall enough so that the rotor coil spins slightly above the stator magnets.
14. Tape the flat feet to a table top, with enough space for rotor coil between.
15. Straighten the rotor axles.
16. Spin the rotor coil in the cradle bearings and observe imbalance. Add tape to the lighter side until it spins freely.
17. Place the stator magnets directly under the rotor coil.
18. Using a rubber band, connect the loose ends of the bearing wires to the two terminals of the battery.
19. Spin rotor to start motor. Remove rotor to preserve battery when not in use.
20. (optional) Change rotor - experiment with rotor shape, number of turns, etc.
21. (optional) Change power supply - experiment with cells in series, different types of batteries, etc.
22. (optional) Change base - make motor portable by attaching to wood, cardboard, or foam plastic base. Create conversation piece by concealing battery and stator magnet inside inverted, decorated foam cup.

VI. Bill of Materials

4 feet Enameled Copper Magnet Wire, 20 ga.
D or C cell Flashlight Battery
Masking Tape
Thread
Paint or Nail Polish
Rubber Bands
Stiff Construction Paper
6 Bar Magnets, apx. 1/4" x 1/4" x 1"

VII. Tools Needed

Pencil
Ruler
Wire cutter or Heavy scissor
Small knife, single edged razor blade, or fine sandpaper
Cork (apx. 1¼" Dia.) or similar tapered object
Fine paint brush
Paint thinner
Magnetic compass

Reference:

Renner, A. G., How to Make and Use Electric Motors.
G.P. Putnam's Sons: New York, 1974.

PINHOLE CAMERA
GRADE LEVEL 6

I. OBJECTIVES

The Student Will Be Able To:
A. Cut using a sharp bladed knife
B. Paint using an aerosol spray paint container
C. Punch a hole in thin metal (aluminum)
D. Measure using a ruler
E. Expose photosensitive paper to light
F. Develop a print in the darkroom

II. DEVELOPMENTAL TASKS FACILITATED BY THIS PROJECT

A. Ability to comprehend the principle of the photographic process
B. Better understanding of how a camera operates (basic)
C. Greater independence in performing activities on students behalf (self-awareness)
D. Ability to accurately measure and record various times, amounts.
E. Exploration and experimentation is motivated

III. INTEGRATION OF PROJECT WITH OTHER SUBJECTS IN THE SCHOOL CURRICULUM

A. Mathematics:
1. metric system
2. measuring, estimating, interposating
3. maintaining a record (f/stops, shutter diameter)

B. Language Arts:
1. vocabulary - INFRARED, APERTURE, EMULSION, PANATOMIC PHOTOGRAPHY, IMAGE, ETC.
2. how these new words are used in other subject areas like Art.

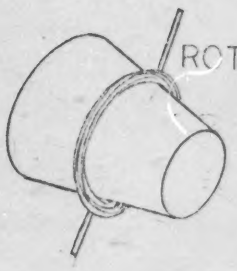
C. History:
1. the making of a Daguerreotype
2. photography isn"t that old (relate to other historical events

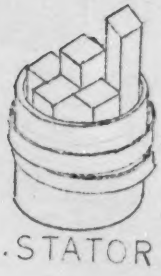
D. English:
1. reading is essential to learn more about an already interesting topic

E. Art:
1. similar mediums, Color, Light, Tone, Image, Creativity,

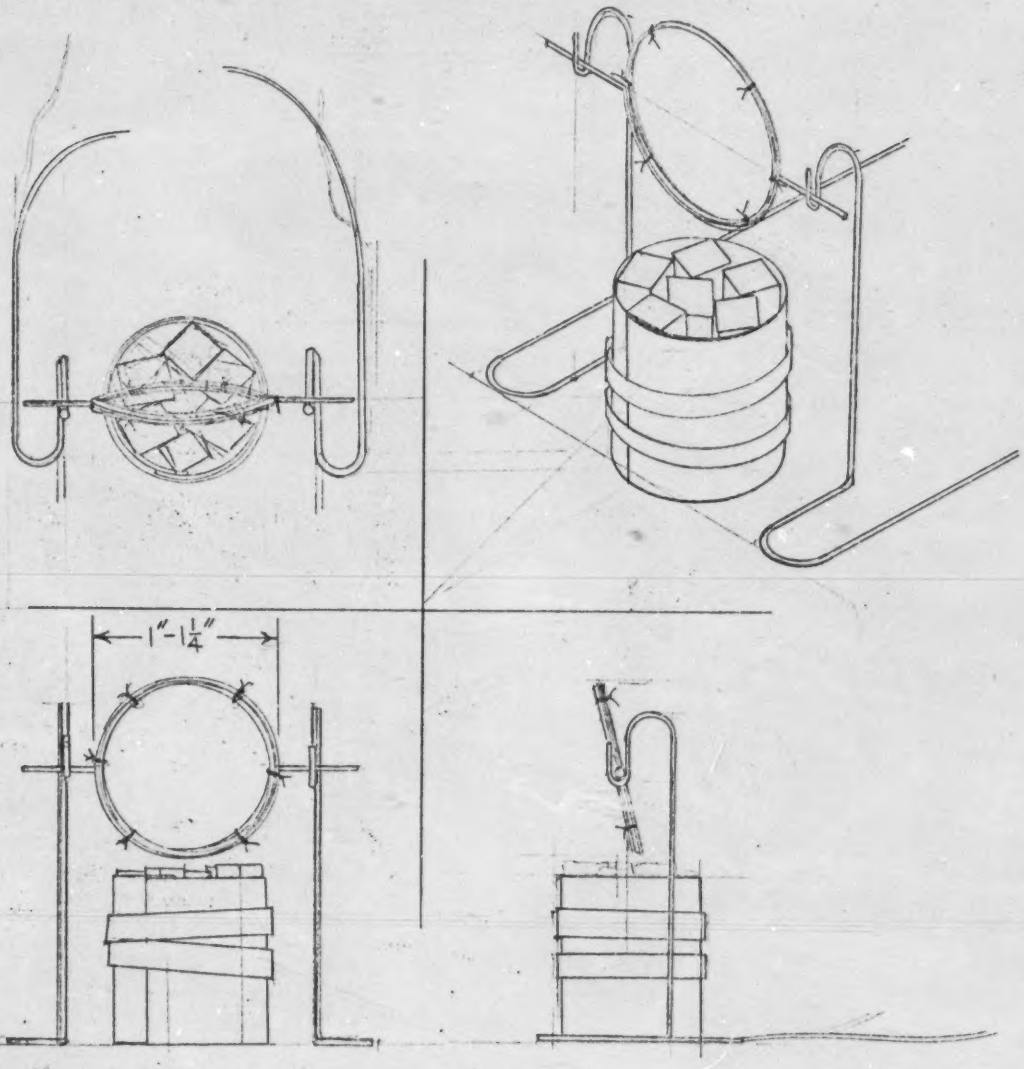
F. Science:
1. light, color, spectrum
2. modern day useages of photography
   a. satelites
   b. moon and mars landing
   c. gamma rays, ultraviolet rays, infrared rays, radio waves

G. Health:
1. Rolled Oats (nutrition information, ruffage,)





ELECTRIC MOTOR



IV. HOW PROJECT FACILITATES CAREER EDUCATION

1. An interesting hobby or pastime can lead to a career.
2. Different careers within the framework of photography: EX. chemist, scientist, glass researcher, newspaper photographer, magazine photographer, film maker, etc.
3. A stimulating school subject (something to look ahead at).
4. The barrier preventing a person from achieving a career he or she deserves can be knocked down if that person has a solid formal education in elementary school years.
5. The fundamental purpose of education is to prepare people to live a productive and rewarding life.

V. PROCEDURE (camera construction)

1. Obtain necessary tools and materials.
2. Cut an opening in the side of the container for the pinhole aperture.
3. Spray paint the inner surface with non-glossy paint. Black is a recommended color. Exterior decoration is optional per individual.
4. Cut a 7.5 cm. sq. (3 in.) piece of aluminum foil. Smooth foil on flat hard surface.
5. Carefully punch a hole through the foil using a sewing needle. Keep foil flat on surface - rotate foil keeping pin vertically pointed into the surface.us
6. Secure foil over aperture hole using masking tape.
7. Construct shutter. Use 1/16" poster board. The shutter should measure approximately 7.5 cm. by 10 cm.,(3" x 4").
8. Secure shutter into position using two rubber bands.
9. Load camera in dar room. Use regular enlarging paper. Resin Coated Photographic Paper is recommended due to the shortened washing time.
10. Replace cover (see sketch) of pinhole camera with pointer aimed in the proper direction.

VI. PROCPROCEDURE (making an exposure and developing a print)

1. Load camera with enlarging paper. The 18 oz. size Quaker Oats container accepts a 5" x 7" (12.5 cm. by 17.5 cm.) piece of enlarging paper
2. Make an exposure. Usually ten to fifteen minutes is long enough. The best time must be found only by experimentation. Note: Exposure time is dependent upon size of the pinhole. A small pinhole will give sharper, more accurate photographs.
3. Process the paper to achieve negative. Work only under a safelight. (A flashlight with a red lens is very effective)

   CHEMICAL SEQUENCE: developer, stopbath, fixer, wash

4. Chemicals can be found at any photographic dealer. Be sure to carefully follow the mixing directions.
5. After washing, blot, place between weights, or pin onto bulletin board.
6. Make a contact print to achieve POSITIVE IMAGE.
7. A desk lamp can be used to make the contact print. In the darkroom, place the paper negative (emulsion to emulsion) next to a sheet of enlarging paper.
8. Process the paper. Repeat step # three.

VII. BILL OF MATERIALS

1. Quaker Oats Container (18 oz.)
2. flat-black spray paint
3. black poster board (1/16")
4. rubber bands (2)
5. masking tape
6. photographic enlarging paper (single weight, 12.5 cm. x 17.5 m.) Resin Coated Enlarging Paper is recommended
7. paper developer
8. paper fixer
9. water
10. paper
11. desk lamp
12. pins or sewing needles
13. aluminum foil

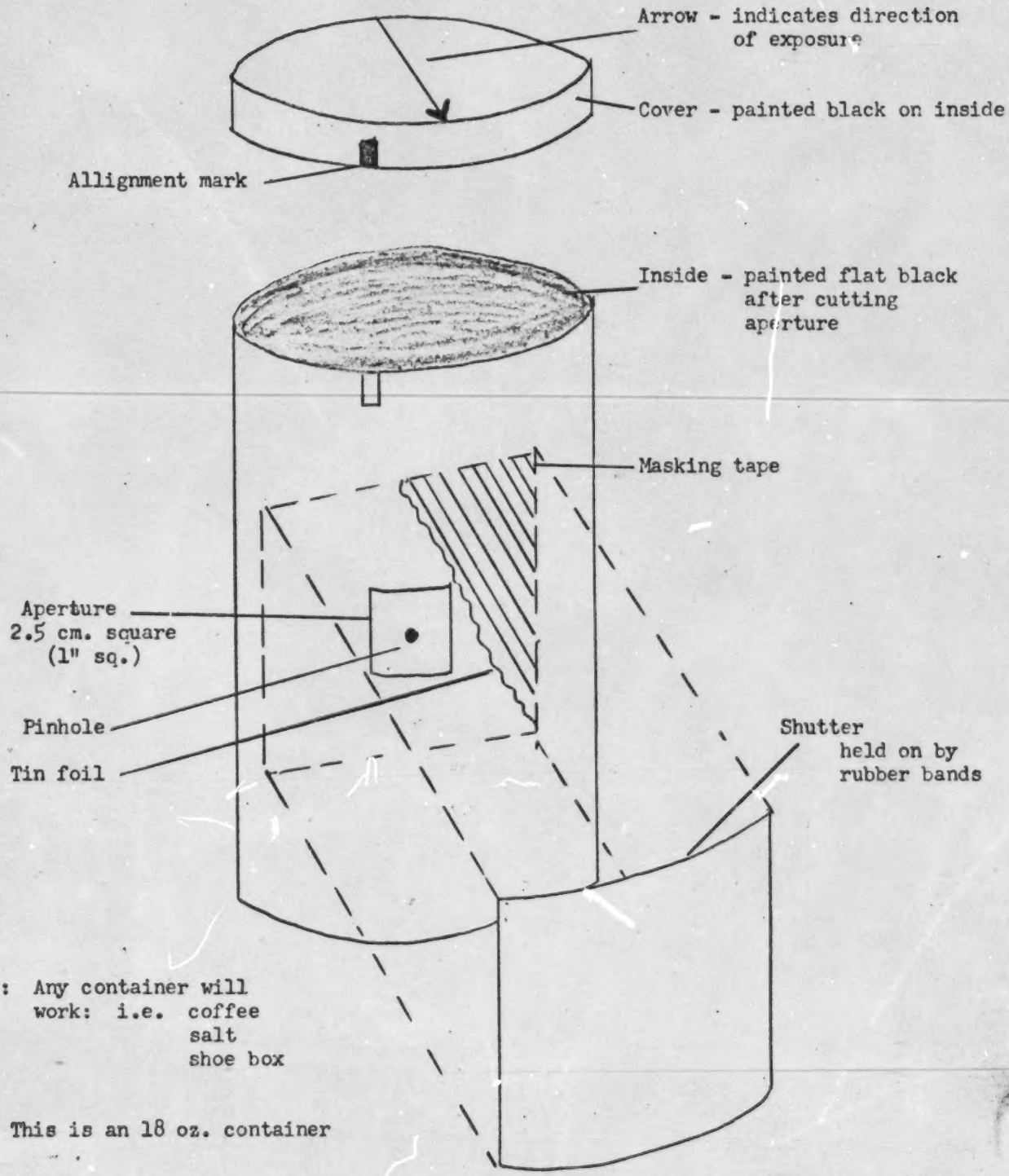
VIII. TOOLS REQUIRED

1. metric ruler
2. pencil
3. X-ACTO knife
4. scissors

this article appeared in the October and November issue of "Popular Photography" in 1975. The author is Mr. Don Cyr.

EXPLODED VIEW OF PINHOLE CAMERA

GRADE 6


Arrow - indicates direction of exposure
Cover - painted black on inside
Allignment mark
Inside - painted flat black after cutting aperture
Masking tape
Aperture 2.5 cm. square (1" sq.)
Pinhole
Tin foil
Shutter held on by rubber bands

Note: Any container will work: i.e. coffee
salt
shoe box

This is an 18 oz. container

NAPKIN HOLDER - SUGGESTED GRADE LEVEL - 6

I. Objectives

Upon completion of this project, the student will be able to:

1. Use a measuring device to mark out materials to specific lengths.
2. Use a miter box to cut to specific lengths.
3. Use abrasive paper to sand project.
4. Use hammer and nails to fasten parts.
5. Locate the center of a rectangle.
6. Use a doweling jig and bit brace to bore holes.
7. Application of stain to color project.
8. Application of finish to protect project.

II. Developmental Tasks Facilitated by Project

1. Further development of eye-hand coordination.
2. Greater individual responsibility.
3. Assembly-line techniques.
4. Avocational pursuits.
5. Further muscular development.

III. Integration of Project With Other Subject Areas

1. Mathematics - whole numbers and fractions on measuring device.
2. History - study of colonial and present day woodware products.
3. Language Arts - tool vocabulary terms.
4. Science - botany - tree growth - common species.

IV. How Project Facilitates Career Education

1. Various wood industry careers.
2. Related careers.
3. Skill and unskilled workers.

V. Procedure

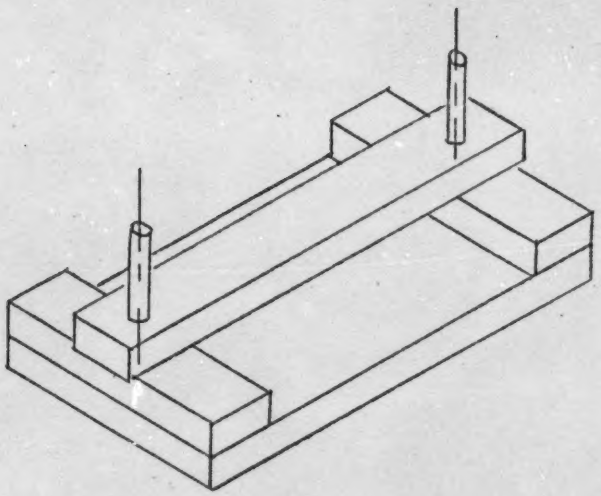
1. Measure and cut in miter box one 10" piece from 1"x6" stock.
2. Measure and cut in miter box two 5½" pieces from 1"x2" stock.
3. Measure and cut in miter box one 10½" piece from 1"x2" stock.
4. Measure and cut in miter box two 4" pieces from ½" dowel rod.
5. Sand all parts with sandpaper.
6. Glue and nail 5½" pieces onto ends of 10" piece.
7. Locate center of 5½" pieces.
8. With doweling jig and bit and brace - drill ½" hole in center of 5½" pieces, 1" deep.
9. Glue dowels in ½" holes.
10. Locate holes in 10½" piece.
11. With doweling jig and bit brace - drill two 5/8" holes completely through.
12. Stain project.
13. Apply finish.

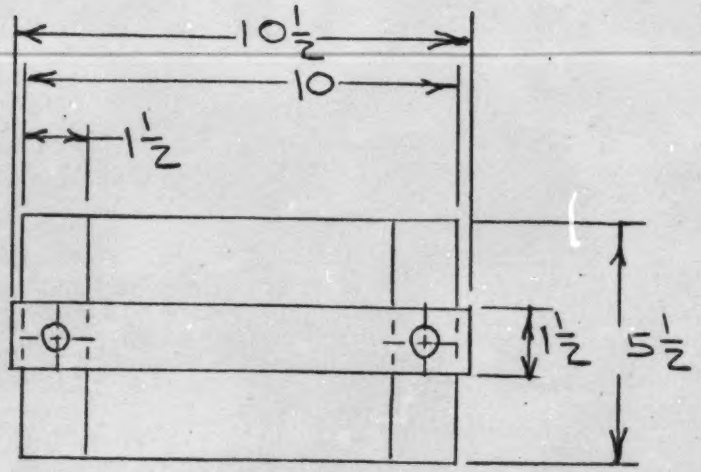
VI. Bill of Materials

1"x6"x10" pine or other specie
1"x2"x21½" pine or other specie
½"x8" dowel rod
4 - 4d finish nails
glue
sandpaper
stain (latex-type)
deft

VIII. Tools Needed

Miter box
Bench rule
Pencil
Hammer
Nail set
Dowel jig
Bit brace
Auger bits ½" and 5/8"
Rags
Paint brush

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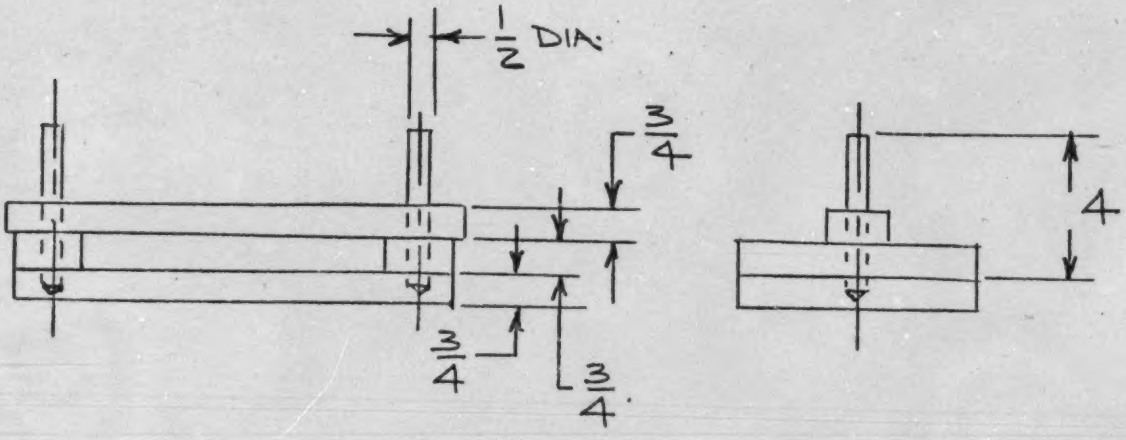
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WOOD SCULPTURE-SUGGESTED GRADE LEVEL-6

A. Objectives
Upon completion of this project, the student will be able to:
1. make a template for the form to be sculptured.
2. use a coping saw to remove excess material.
3. use the various Surform tools to remove excess material.

B. Developmental tasks facilitated by this project:
1. an interest in earning money.
2. opportunities for greater independence, and for carrying more responsibility without pressure.

C. Integration of project with other subject areas.
1. Social studies-study of sculpture for a given time period.
-field trips to museums.
-guest speakers.
2. Language Arts-read books about sculpture.
-research.
-study of vocabulary.
3. Math-measurements used in layout of form.
-proportions used in layout of form.
4. Science-study of materials used.
-study of tree science.
-study of conservation of resources.
5. Art-study of design.
-study of colors, both natural and artificial.

D. How project facilitates career education:
1. study of craft occupations.
2. study of lumber occupations.
3. study of finish occupations.

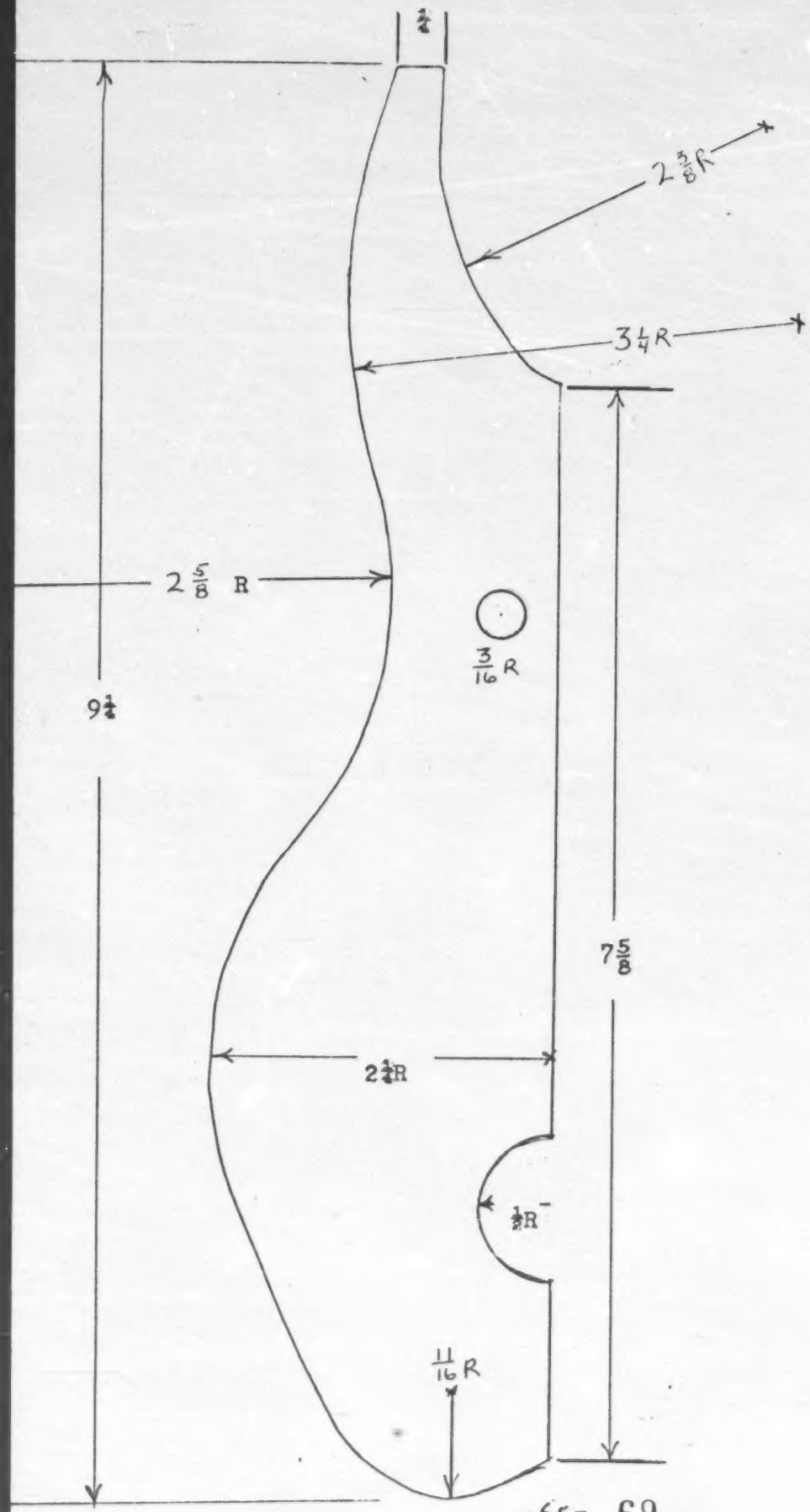
E. Construction and assembly procedure.
1. Measure and layout template for form.
2. Measure and layout template for base.
3. Using scissors, cut out both templates.
4. Using templates, trace both forms on stock.
5. Using a drill, bore a 1" hole in area indicated.
6. Using a drill, bore two three-eighths inch holes in areas indicated.
7. Using a coping saw, remove waste stock from form to be sculptured. (Note: leave pencil lines on.)
8. Using hand saw, remove waste stock from base. (Note: leave pencil lines on.)
9. Using the shaver and round file, round over all edges.
10. Using sandpaper, sand all edges. Start with 80 grit, then use 120 grit, then use 150 grit, sanding in one direction only.
11. Using drill, make a pilot hole in the base area as indicated, as well as in the bottom of the form,

in area indicated.
12. Using sandpaper, sand all surfaces. Start with 120 grit, then use 150 grit, and remember always to sand with the grain.
13. Clean both pieces to remove dust.
14. Apply two coats of stain to each piece, allowing time between coats, for stain to dry.
15. Apply wax to each piece, let dry and buff.
16. Assemble.

F. Bill of materials.
1. Pine-1 piece 1" X 6" X 12"
-1 piece 1" X 6" X 6"
2. One coat hanger.
3. Sand paper-80, 120, and 150 grits.
4. Stain.
5. Wax.
6. Rags.

G. Tools:
1. coping saw
2. 1" drill bit
3. 3/8" drill bit
4. Surform shaver
5. Surform file
6. 3/8" drill
7. scissors

SAMPLE OF A TEMPLATE


2 3/8 R
3 1/4 R
2 5/8 R
3/16 R
9 1/2
7 5/8
2 1/2 R
1/2 R
11/16 R

WORKSHOP OUTLINE

Suggested Procedure for a Workshop to Implement an Industrial Arts Program in Grades K-6

This program will consist of five sessions. Each session will last two hours.

1st SESSION

A) Introduction
   1) What is Industrial Arts?
   2) How can the student benefit from it?

B) Work Session
   1) Teachers are divided into groups by grade level to develop a definition of elementary IA.

C) Conclusion
   1) Compose a definition of elementary IA that is acceptable to all.
   2) Display typical projects that can be made by elementary students.

2nd SESSION

A) Introduction
   1) Review definition of elementary IA from 1st session workshop.

B) Wo k Session
   1) Divide into grade level groups. Each level plams how to intergrate IA into their curriculum.
   2) While in groups teachers will discuss IA projects suitable for their grade and how these projects will fit into the curriculum.

C) Conclusion
   1) Each group will report on how they will intergrate IA into their program.

3rd SESSION

A) Introduction
   1) Tools and materials used by elementary students to

make projects.
2) Safety rules for the use of the tools.
3) Discussion of IA learning center in each classroom.

B) Work Session
1) Each participant will have the opportunity to examine and use the tools and materials.
2) Each grade level will discuss which tools and materials are appropriate for their students.

C) Conclusion
1) Each group will report which tools and materials they have selected - why these were selected and others rejected.

4th and 5th SESSIONS

A) Work Ssession
1) Hands-on-experience making individual projects.
2) Group and individual sessions on the proper use of tools, material and safety.

B) Conclusion
1) Report by each workshop participant on their projects.

SUGGESTED LIST OF EQUIPMENT FOR INDUSTRIAL ARTS ELEMENTARY CLASSES

Tools may be mounted on a movable cart or room mounted. List based on a student population of twenty students. (Subject to revision to meet individual teaching needs).

2 sets auger bits
4 bit braces
10 C clamps 4"
2 countersinks 3/4"
2 dividers 6"
4 drills, hand
2 sets of twist drills 1/16" to 1/2"
2 file cards
4 flat files w/handles
4 half round cabinet files 10" w/handles
2 round files 10" w/handles
2 three square files 10" w/handles
2 half round cabinet rasps 10" w/handles
4 surforms
4 extra blades for above, flat
4 extra blades for above, half round
4 pocket surforms
4 pocket surform blades
5 hammers - 7 oz.
5 hammers - 12 oz.
2 nail sets 2/32"
4 block planes
4 smooth planes
2 exacto knifes
1 package needles
1 rubber mallet
4 - 16 oz. containers titebond glue
100 sheets garnet cabinet paper - 80 grit
100 sheets garnet cabinet paper - 120 grit
1 pair pliers, combination 6"
1 pair side cutting pliers 6"
6 bench rules 24"
6 bench rules 12"

4 saws, back, 10"
2 saws, compass, 14"
12 saws, coping 6½"
100 extra blades for above
3 saws, hand crosscut 16" 11 point
3 saws, hand crosscut 20" 10 point
4 saws, hand rip 20" 5½ point
2 saws, keyhole
8 scissors
3 screw drivers, assorted
4 scratch awls
4 squares, try, 8"
4 combination squares 12"
6 vises, detachable
2 paper punches
10 plastic yarn needles
2 razor knives
2 tin snips
1 wooden mallet
1 miter box
1 set of wooden chisels
10 lbs. 6d box nails
10 lbs. 2d finish nails
10 lbs. 4d finish nails
10 lbs. 6d finish nails
10 lbs. 8d common nails
5 lbs. flathead screws ½"
5 lbs. flathead screws 1"
5 lbs. flathead screws 1½"
12 rolls masking tape
10 cans paint
10 ½" paint brushes
10 1" paint brushes
10 artist brushes
1 assortment poly-brushes
2 adjustable wrenches
1 wire stripper
4 compasses
20 aprons
1 magnetic compass
20 pairs safety glasses

Option electric power tool
1 1/4" electric drill

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